Zwitterionic and cationic bis(phosphine) platinum(II) complexes. Structural, electronic, and mechanistic comparisons relevant to ligand exchange and benzene C-H activation processes.

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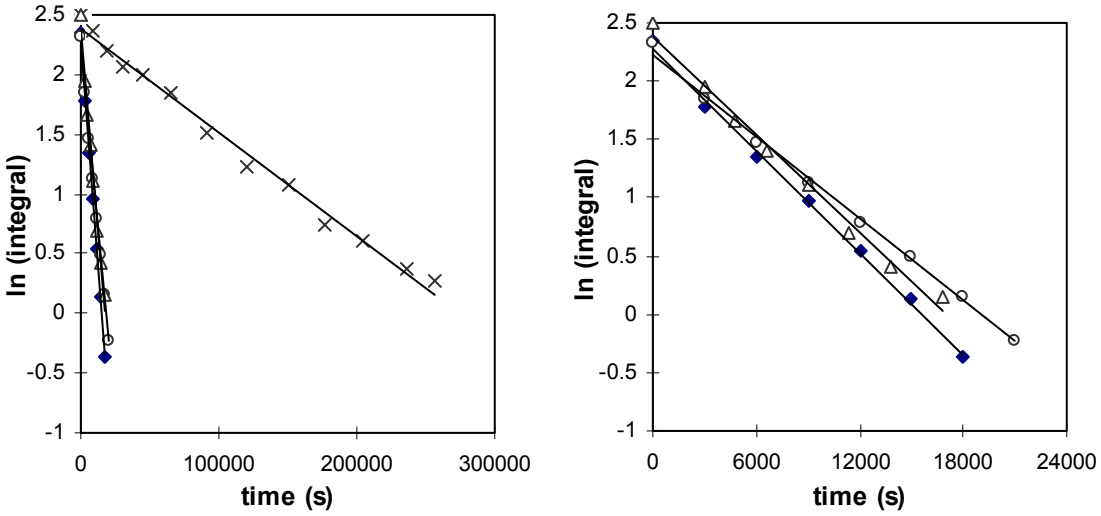
Supporting Information



(a) (b)

Figure 1. Plots of representative kinetic data obtained for complex **13** at 45 ºC in C_6H_6 (♦), C_6D_6 (o), in C_6H_6 with 1 equiv [^{n}Bu$_4$N][B(C_6F_5)$_4$] (Δ), and in C_6H_6 with 5 equiv THF (×). Plot (b) is an expansion of plot (a) for clarity.

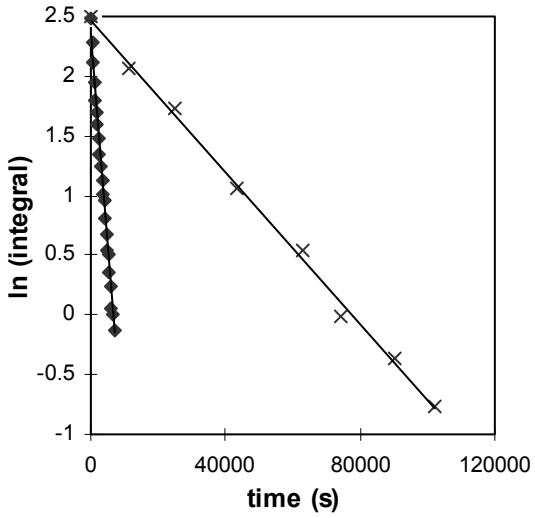
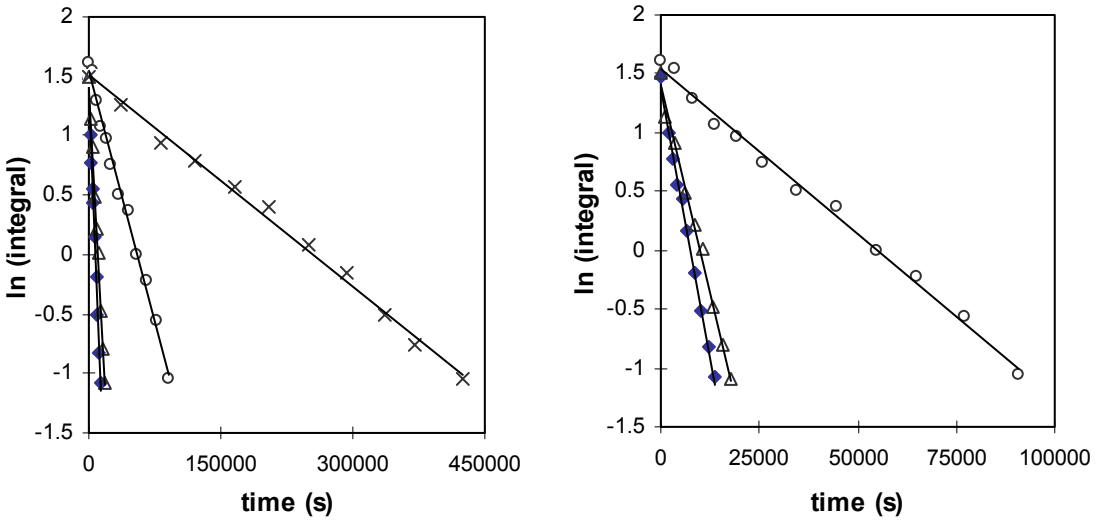


Figure 2. Plot of representative kinetic data obtained for complex **13** at 55 ºC in C_6D_6 (♦) and in C_6H_6 with 5 equiv THF (×).



(a) (b)

Figure 3. Plots of representative kinetic data obtained for complex **14** at 55 ºC in C_6H_6 (♦), C_6D_6 (o), in C_6H_6 with 1 equiv [^{n}Bu$_4$N][B(C_6F_5)$_4$] (Δ), and in C_6H_6 with 5 equiv THF (×). Plot (b) is an expansion of plot (a) for clarity.

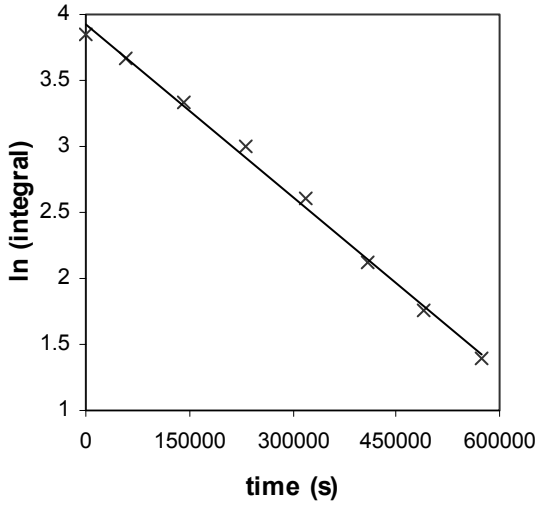
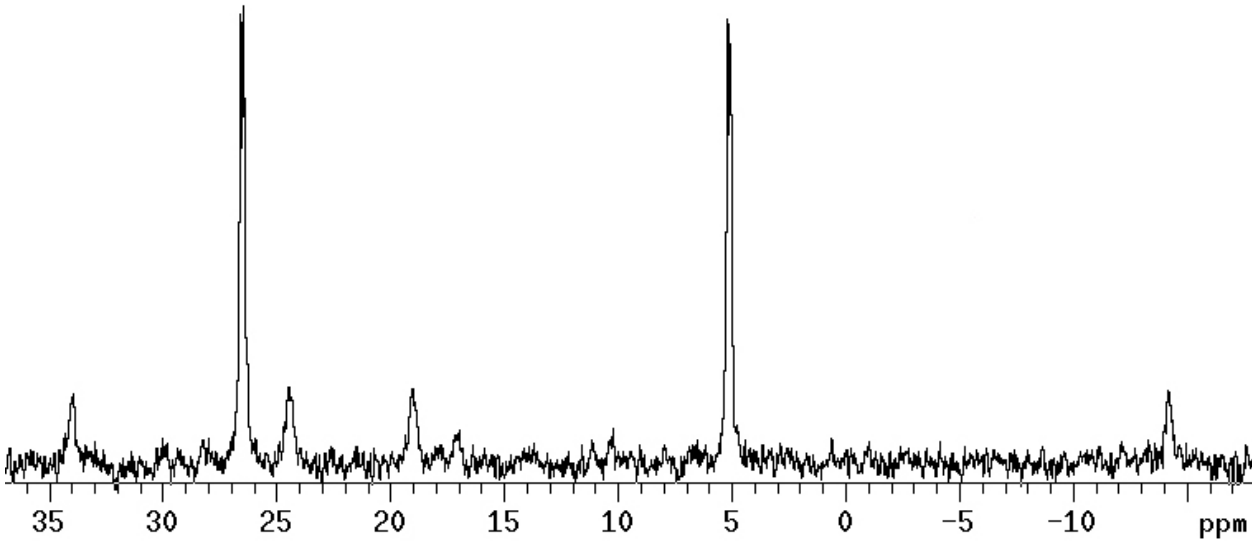
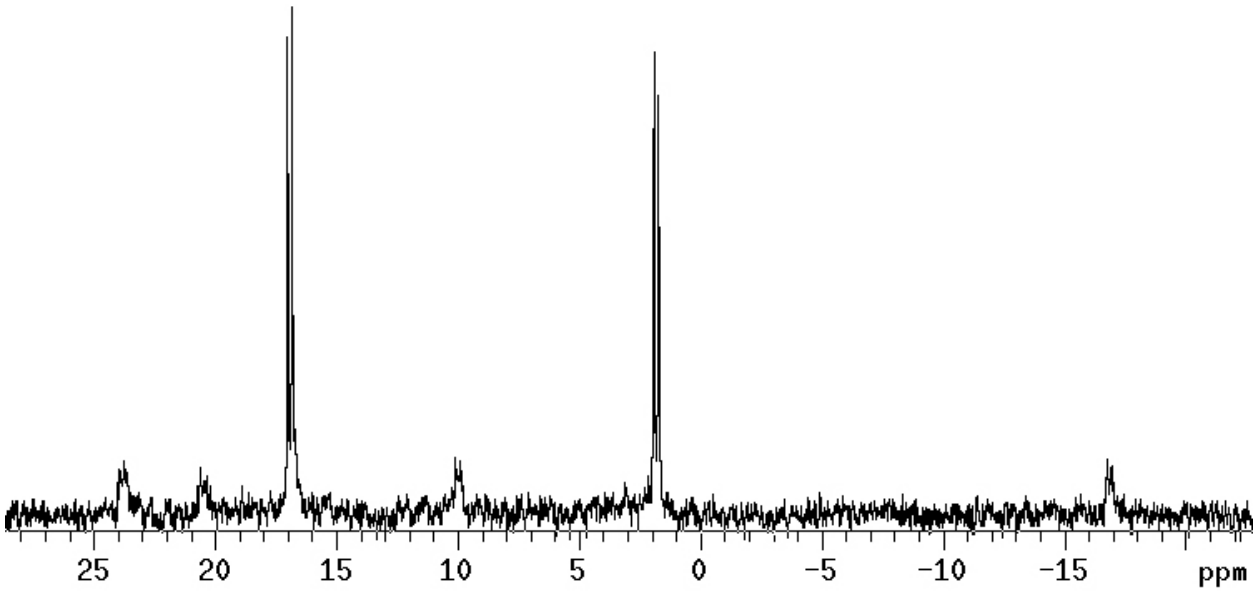


Figure 4. Plot of representative kinetic data obtained for complex **15** at 55 ºC in C_6H_6 with 5 equiv THF (×).



(a) [(Ph_2SiP_2)Pt(Me)(THF)][$B(C_6F_5)_4$] (14).

Figure 5. Representative $^{31}P\{^1H\}$ NMR spectrum at 25 ºC in benzene-d_6 of complex **14.**



(b) [(dppp)Pt(Me)(THF)][$B(C_6F_5)_4$] (15).

Figure 6. Representative $^{31}P\{^1H\}$ NMR spectrum at 25 ºC in benzene-d_6 of complex **15.**

General X-ray experimental information

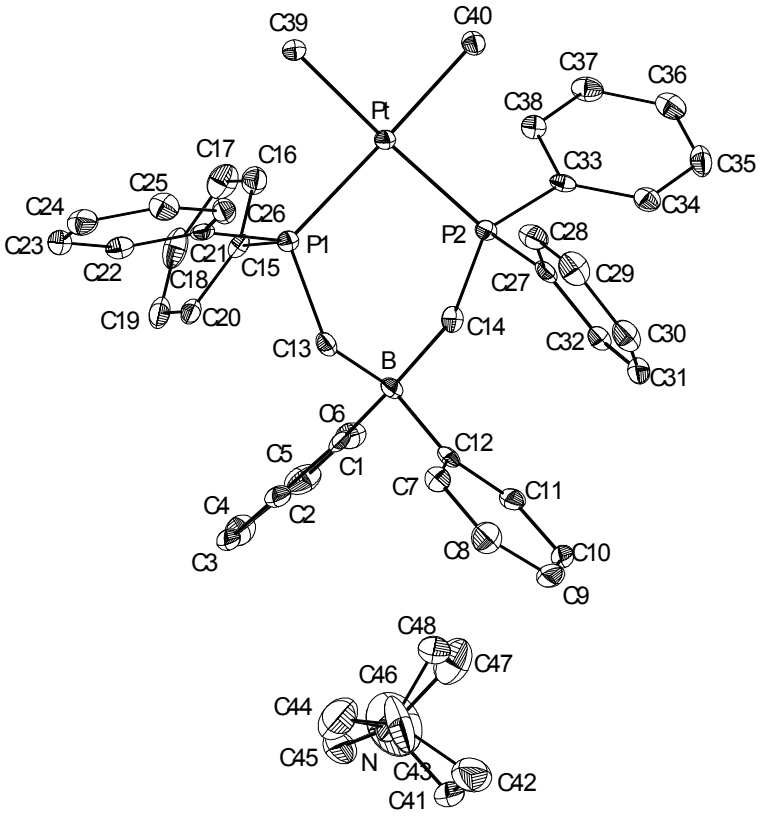
Crystals were mounted on a glass fiber with Paratone-N oil. Crystallographic data were collected on a Bruker P4 diffractometer (0.71073 Å MoKα) with a CCD area detector. Data were collected using the Bruker SMART program, collecting ω scans at 5 ϕ settings. Data reduction was performed using Bruker SAINT v6.2. Structure solution and structure refinement were performed using SHELXS-97 (Sheldrick, 1990) and SHELXL-97 (Sheldrick, 1997).

Refinement of F^2 against ALL reflections. The weighted R-factor (*w*R) and goodness of fit (S) are based on F^2, conventional R-factors (R) are based on F, with F set to zero for negative F^2. The threshold expression of $F^2 > 2\sigma(F^2)$ is used only for calculating R-factors(gt) etc. and is not relevant to the choice of reflections for refinement. R-factors based on F^2 are statistically about twice as large as those based on F, and R-factors based on ALL data will be even larger.

All esds (except the esd in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell esds are taken into account individually in the estimation of esds in distances, angles and torsion angles; correlations between esds in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell esds is used for estimating esds involving l.s. planes.

Crystallographic data have been deposited at the CCDC, 12 Union Road, Cambridge CB2 1EZ, UK and copies can be obtained on request, free of charge, by quoting the publication citation and the deposition number 151640 (**7**), 198492 (**8·toluene**), 198491 (**9**), 156632 (**13·2THF**), 186231 (**19·4(*o*-xylene)**), 198490 (**25·benzene**).

Figure 7. Fully labeled drawing of [[Ph_2BP_2]$PtMe_2$][ASN] (**7**) (hydrogen atoms omitted).



Drawing of **7** emphasizing the packing interactions of the ASN cation with the anionic diphenylborate fragment of one molecule and the platinum dimethyl fragment of an adjacent molecule.

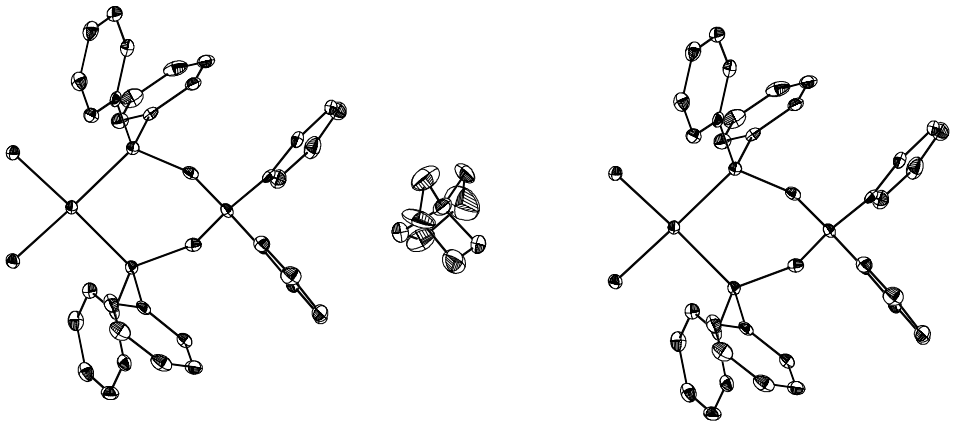


Table 1. Crystal data and structure refinement for [[Ph_2BP_2]$PtMe_2$][ASN] (7).

Empirical formula	$[C_{40}H_{40}BP_2Pt][N(C_4H_8)_2]$
Formula weight	914.78
Crystallization Solvent	Acetonitrile
Crystal Habit	Block
Crystal color	Colorless
Crystal size	0.27 x 0.23 x 0.22 mm^3
Data Collection	
Data collection temperature	98(2) K
Unit cell dimensions	a = 14.7979(6) Å
	b = 15.9490(7) Å β= 91.488(1)°
	c = 17.6093(7) Å
Volume	4154.6(3) $Å^3$
Z	4
Crystal system	Monoclinic
Space group	$P2_1/n$
Density (calculated)	1.462 Mg/m^3
F(000)	1856
θ range for data collection	1.72 to 28.41°
Completeness to θ = 28.41°	93.9%
Index ranges	$-19 \le h \le 19$, $-20 \le k \le 21$, $-22 \le l \le 23$
Reflections collected	60637
Independent reflections	9805 [R_{int}= 0.0771]
Absorption coefficient	3.488 mm^{-1}
Absorption correction	None
Structure solution and Refinement	
Primary solution method	Direct methods
Secondary solution method	Difference Fourier map
Hydrogen placement	Calculated
Refinement method	Full matrix least-squares on F^2
Data / restraints / parameters	9805 / 0 / 699
Goodness-of-fit on F^2	1.203
Final R indices [I>2σ(I), 7621 reflections]	R1 = 0.0273, *w*R2 = 0.0514
R indices (all data)	R1 = 0.0384, *w*R2 = 0.0529
Type of weighting scheme used	Sigma
Weighting scheme used	$w=1/\sigma^2(Fo^2)$
Largest diff. peak and hole	1.589 and -0.719 e.$Å^{-3}$

Table 2. Bond lengths [Å] and angles [°] for [[Ph_2BP_2]$PtMe_2$][ASN] (7).

Pt(1)-C(39)	2.134(3)	C(23)-C(24)	1.391(4)
Pt(1)-C(40)	2.132(3)	C(23)-H(23)	0.97(3)
Pt(1)-P(2)	2.2776(7)	C(24)-C(25)	1.381(4)
Pt(1)-P(1)	2.2829(7)	C(24)-H(24)	0.95(3)
P(1)-C(1)	1.824(3)	C(25)-C(26)	1.391(4)
P(1)-C(15)	1.833(3)	C(25)-H(25)	1.01(3)
P(1)-C(21)	1.831(3)	C(26)-H(26)	0.87(3)
P(2)-C(2)	1.818(3)	C(27)-C(28)	1.395(4)
P(2)-C(33)	1.828(3)	C(27)-C(32)	1.403(4)
P(2)-C(27)	1.834(3)	C(28)-C(29)	1.395(4)
B-C(9)	1.650(4)	C(28)-H(28)	0.98(3)
B-C(3)	1.648(4)	C(29)-C(30)	1.390(4)
B-C(2)	1.652(4)	C(29)-H(29)	0.86(3)
B-C(1)	1.671(4)	C(30)-C(31)	1.374(4)
C(1)-H(1A)	0.99(3)	C(30)-H(30)	0.93(3)
C(1)-H(1B)	0.95(3)	C(31)-C(32)	1.385(4)
C(2)-H(2A)	0.96(3)	C(31)-H(31)	0.95(3)
C(2)-H(2B)	0.95(3)	C(32)-H(32)	0.82(3)
C(3)-C(8)	1.394(4)	C(33)-C(34)	1.384(4)
C(3)-C(4)	1.403(4)	C(33)-C(38)	1.400(4)
C(4)-C(5)	1.387(4)	C(34)-C(35)	1.388(4)
C(4)-H(4)	0.94(3)	C(34)-H(34)	0.83(3)
C(5)-C(6)	1.374(5)	C(35)-C(36)	1.375(4)
C(5)-H(5)	0.86(3)	C(35)-H(35)	0.88(3)
C(6)-C(7)	1.384(5)	C(36)-C(37)	1.385(5)
C(6)-H(6)	0.89(3)	C(36)-H(36)	0.89(3)
C(7)-C(8)	1.387(4)	C(37)-C(38)	1.383(4)
C(7)-H(7)	0.96(3)	C(37)-H(37)	0.95(3)
C(8)-H(8)	0.94(3)	C(38)-H(38)	0.95(3)
C(9)-C(10)	1.394(4)	C(39)-H(39A)	0.97(3)
C(9)-C(14)	1.406(4)	C(39)-H(39B)	0.83(3)
C(10)-C(11)	1.394(4)	C(39)-H(39C)	1.04(3)
C(10)-H(10)	0.97(3)	C(40)-H(40A)	0.99(3)
C(11)-C(12)	1.380(5)	C(40)-H(40B)	0.99(3)
C(11)-H(11)	0.88(3)	C(40)-H(40C)	0.86(3)
C(12)-C(13)	1.376(5)	N(1)-C(58)	1.496(5)
C(12)-H(12)	0.88(3)	N(1)-C(54)	1.509(4)
C(13)-C(14)	1.384(4)	N(1)-C(55)	1.511(4)
C(13)-H(13)	0.89(3)	N(1)-C(51)	1.515(5)
C(14)-H(14)	0.99(2)	C(51)-C(52)	1.473(8)
C(15)-C(16)	1.386(4)	C(51)-H(51A)	0.87(5)
C(15)-C(20)	1.398(4)	C(51)-H(51B)	0.88(4)
C(16)-C(17)	1.389(4)	C(52)-C(53)	1.468(7)
C(16)-H(16)	0.89(3)	C(52)-H(52A)	0.91(5)
C(17)-C(18)	1.381(4)	C(52)-H(52B)	0.99(6)
C(17)-H(17)	0.83(3)	C(53)-C(54)	1.508(5)
C(18)-C(19)	1.381(4)	C(53)-H(53A)	1.00(4)
C(18)-H(18)	0.94(3)	C(53)-H(53B)	1.01(4)
C(19)-C(20)	1.386(4)	C(54)-H(54A)	0.98(3)
C(19)-H(19)	0.91(3)	C(54)-H(54B)	1.05(3)
C(20)-H(20)	0.98(3)	C(55)-C(56)	1.508(6)
C(21)-C(22)	1.390(4)	C(55)-H(55A)	0.93(4)
C(21)-C(26)	1.401(4)	C(55)-H(55B)	1.09(4)
C(22)-C(23)	1.389(4)	C(56)-C(57)	1.528(6)
C(22)-H(22)	0.99(3)	C(56)-H(56A)	0.92(4)

C(56)-H(56B)	0.98(4)	C(8)-C(7)-H(7)	120.0(19)
C(57)-C(58)	1.517(6)	C(7)-C(8)-C(3)	122.8(3)
C(57)-H(57A)	0.84(4)	C(7)-C(8)-H(8)	117.9(18)
C(57)-H(57B)	1.021(5)	C(3)-C(8)-H(8)	119.2(18)
C(58)-H(58A)	1.10(5)	C(10)-C(9)-C(14)	115.1(3)
C(58)-H(58B)	1.05(5)	C(10)-C(9)-B	125.2(3)
		C(14)-C(9)-B	119.6(3)
C(39)-Pt(1)-C(40)	86.56(12)	C(9)-C(10)-C(11)	122.6(3)
C(39)-Pt(1)-P(2)	178.05(9)	C(9)-C(10)-H(10)	118.9(17)
C(40)-Pt(1)-P(2)	91.86(9)	C(11)-C(10)-H(10)	118.5(17)
C(39)-Pt(1)-P(1)	90.97(9)	C(12)-C(11)-C(10)	120.0(3)
C(40)-Pt(1)-P(1)	177.03(9)	C(12)-C(11)-H(11)	121(2)
P(2)-Pt(1)-P(1)	90.64(2)	C(10)-C(11)-H(11)	119(2)
C(1)-P(1)-C(15)	106.03(13)	C(13)-C(12)-C(11)	119.2(3)
C(1)-P(1)-C(21)	102.29(13)	C(13)-C(12)-H(12)	120(2)
C(15)-P(1)-C(21)	105.04(12)	C(11)-C(12)-H(12)	121(2)
C(1)-P(1)-Pt(1)	116.04(10)	C(12)-C(13)-C(14)	120.1(3)
C(15)-P(1)-Pt(1)	113.94(10)	C(12)-C(13)-H(13)	125(2)
C(21)-P(1)-Pt(1)	112.30(9)	C(14)-C(13)-H(13)	115(2)
C(2)-P(2)-C(33)	107.19(13)	C(13)-C(14)-C(9)	122.8(3)
C(2)-P(2)-C(27)	101.31(13)	C(13)-C(14)-H(14)	121.3(16)
C(33)-P(2)-C(27)	105.24(12)	C(9)-C(14)-H(14)	115.9(15)
C(2)-P(2)-Pt(1)	114.36(10)	C(16)-C(15)-C(20)	118.6(2)
C(33)-P(2)-Pt(1)	113.30(10)	C(16)-C(15)-P(1)	123.3(2)
C(27)-P(2)-Pt(1)	114.32(9)	C(20)-C(15)-P(1)	118.1(2)
C(9)-B-C(3)	105.5(2)	C(15)-C(16)-C(17)	121.0(3)
C(9)-B-C(2)	109.1(2)	C(15)-C(16)-H(16)	123.8(17)
C(3)-B-C(2)	110.5(2)	C(17)-C(16)-H(16)	115.2(17)
C(9)-B-C(1)	109.7(2)	C(18)-C(17)-C(16)	119.7(3)
C(3)-B-C(1)	110.1(2)	C(18)-C(17)-H(17)	122(2)
C(2)-B-C(1)	111.7(2)	C(16)-C(17)-H(17)	119(2)
B-C(1)-P(1)	117.64(19)	C(19)-C(18)-C(17)	120.1(3)
B-C(1)-H(1A)	108.2(17)	C(19)-C(18)-H(18)	121(2)
P(1)-C(1)-H(1A)	110.6(17)	C(17)-C(18)-H(18)	118(2)
B-C(1)-H(1B)	114(2)	C(18)-C(19)-C(20)	120.3(3)
P(1)-C(1)-H(1B)	96.9(18)	C(18)-C(19)-H(19)	121.1(19)
H(1A)-C(1)-H(1B)	109(2)	C(20)-C(19)-H(19)	118.5(19)
B-C(2)-P(2)	119.38(19)	C(19)-C(20)-C(15)	120.3(3)
B-C(2)-H(2A)	110.9(17)	C(19)-C(20)-H(20)	119.7(15)
P(2)-C(2)-H(2A)	100.1(15)	C(15)-C(20)-H(20)	120.0(15)
B-C(2)-H(2B)	112.1(16)	C(22)-C(21)-C(26)	118.1(3)
P(2)-C(2)-H(2B)	108.5(16)	C(22)-C(21)-P(1)	124.8(2)
H(2A)-C(2)-H(2B)	104(2)	C(26)-C(21)-P(1)	117.0(2)
C(8)-C(3)-C(4)	115.1(3)	C(23)-C(22)-C(21)	121.0(3)
C(8)-C(3)-B	124.3(3)	C(23)-C(22)-H(22)	119.1(17)
C(4)-C(3)-B	120.6(2)	C(21)-C(22)-H(22)	119.9(17)
C(5)-C(4)-C(3)	122.5(3)	C(22)-C(23)-C(24)	120.1(3)
C(5)-C(4)-H(4)	119.1(17)	C(22)-C(23)-H(23)	116.1(17)
C(3)-C(4)-H(4)	118.1(16)	C(24)-C(23)-H(23)	123.7(17)
C(6)-C(5)-C(4)	120.6(3)	C(25)-C(24)-C(23)	119.7(3)
C(6)-C(5)-H(5)	121(2)	C(25)-C(24)-H(24)	117.1(16)
C(4)-C(5)-H(5)	119(2)	C(23)-C(24)-H(24)	123.3(16)
C(5)-C(6)-C(7)	118.6(3)	C(24)-C(25)-C(26)	120.1(3)
C(5)-C(6)-H(6)	118(2)	C(24)-C(25)-H(25)	120.4(19)
C(7)-C(6)-H(6)	123(2)	C(26)-C(25)-H(25)	119.5(19)
C(6)-C(7)-C(8)	120.3(3)	C(25)-C(26)-C(21)	120.9(3)
C(6)-C(7)-H(7)	119.7(19)	C(25)-C(26)-H(26)	121(2)

C(21)-C(26)-H(26)	118(2)	C(58)-N(1)-C(51)	113.3(3)
C(28)-C(27)-C(32)	118.4(3)	C(54)-N(1)-C(51)	102.1(3)
C(28)-C(27)-P(2)	125.0(2)	C(55)-N(1)-C(51)	114.0(3)
C(32)-C(27)-P(2)	116.6(2)	C(52)-C(51)-N(1)	104.8(4)
C(27)-C(28)-C(29)	120.6(3)	C(52)-C(51)-H(51A)	110(3)
C(27)-C(28)-H(28)	120.2(17)	N(1)-C(51)-H(51A)	101(3)
C(29)-C(28)-H(28)	119.1(17)	C(52)-C(51)-H(51B)	121(3)
C(30)-C(29)-C(28)	120.0(3)	N(1)-C(51)-H(51B)	108(2)
C(30)-C(29)-H(29)	122.9(19)	H(51A)-C(51)-H(51B)	110(4)
C(28)-C(29)-H(29)	117.0(19)	C(53)-C(52)-C(51)	107.6(4)
C(31)-C(30)-C(29)	119.7(3)	C(53)-C(52)-H(52A)	112(4)
C(31)-C(30)-H(30)	119.8(17)	C(51)-C(52)-H(52A)	111(4)
C(29)-C(30)-H(30)	120.4(17)	C(53)-C(52)-H(52B)	113(4)
C(30)-C(31)-C(32)	120.8(3)	C(51)-C(52)-H(52B)	97(4)
C(30)-C(31)-H(31)	115(2)	H(52A)-C(52)-H(52B)	114(5)
C(32)-C(31)-H(31)	124(2)	C(52)-C(53)-C(54)	106.8(4)
C(31)-C(32)-C(27)	120.4(3)	C(52)-C(53)-H(53A)	119(2)
C(31)-C(32)-H(32)	121(2)	C(54)-C(53)-H(53A)	109(2)
C(27)-C(32)-H(32)	118(2)	C(52)-C(53)-H(53B)	109(2)
C(34)-C(33)-C(38)	118.6(2)	C(54)-C(53)-H(53B)	112(2)
C(34)-C(33)-P(2)	124.2(2)	H(53A)-C(53)-H(53B)	102(3)
C(38)-C(33)-P(2)	117.1(2)	C(53)-C(54)-N(1)	104.5(3)
C(33)-C(34)-C(35)	120.9(3)	C(53)-C(54)-H(54A)	109.6(18)
C(33)-C(34)-H(34)	120(2)	N(1)-C(54)-H(54A)	105.3(18)
C(35)-C(34)-H(34)	119(2)	C(53)-C(54)-H(54B)	116(2)
C(36)-C(35)-C(34)	119.8(3)	N(1)-C(54)-H(54B)	104.8(19)
C(36)-C(35)-H(35)	120.3(18)	H(54A)-C(54)-H(54B)	115(3)
C(34)-C(35)-H(35)	119.8(18)	C(56)-C(55)-N(1)	104.5(3)
C(35)-C(36)-C(37)	120.4(3)	C(56)-C(55)-H(55A)	95(2)
C(35)-C(36)-H(36)	122(2)	N(1)-C(55)-H(55A)	101(2)
C(37)-C(36)-H(36)	117(2)	C(56)-C(55)-H(55B)	121.2(18)
C(38)-C(37)-C(36)	119.9(3)	N(1)-C(55)-H(55B)	101.5(18)
C(38)-C(37)-H(37)	117.3(17)	H(55A)-C(55)-H(55B)	130(3)
C(36)-C(37)-H(37)	122.7(17)	C(55)-C(56)-C(57)	105.0(3)
C(37)-C(38)-C(33)	120.5(3)	C(55)-C(56)-H(56A)	112(3)
C(37)-C(38)-H(38)	116.4(17)	C(57)-C(56)-H(56A)	106(3)
C(33)-C(38)-H(38)	123.0(17)	C(55)-C(56)-H(56B)	113(2)
Pt(1)-C(39)-H(39A)	109(2)	C(57)-C(56)-H(56B)	113(2)
Pt(1)-C(39)-H(39B)	114(2)	H(56A)-C(56)-H(56B)	108(3)
H(39A)-C(39)-H(39B)	106(3)	C(56)-C(57)-C(58)	106.5(4)
Pt(1)-C(39)-H(39C)	110.6(17)	C(56)-C(57)-H(57A)	107(3)
H(39A)-C(39)-H(39C)	110(3)	C(58)-C(57)-H(57A)	116(3)
H(39B)-C(39)-H(39C)	107(3)	C(56)-C(57)-H(57B)	102.7(4)
Pt(1)-C(40)-H(40A)	104.3(17)	C(58)-C(57)-H(57B)	106.7(5)
Pt(1)-C(40)-H(40B)	113.4(17)	H(57A)-C(57)-H(57B)	117(3)
H(40A)-C(40)-H(40B)	110(2)	N(1)-C(58)-C(57)	103.1(3)
Pt(1)-C(40)-H(40C)	112(2)	N(1)-C(58)-H(58A)	109(2)
H(40A)-C(40)-H(40C)	111(3)	C(57)-C(58)-H(58A)	108(2)
H(40B)-C(40)-H(40C)	106(3)	N(1)-C(58)-H(58B)	111(3)
C(58)-N(1)-C(54)	114.5(3)	C(57)-C(58)-H(58B)	117(3)
C(58)-N(1)-C(55)	102.7(3)	H(58A)-C(58)-H(58B)	109(4)
C(54)-N(1)-C(55)	110.6(3)		

Figure 8. Fully labeled drawing of $(Ph_2SiP_2)PtMe_2$·toluene (**8·toluene**) (hydrogen atoms omitted).

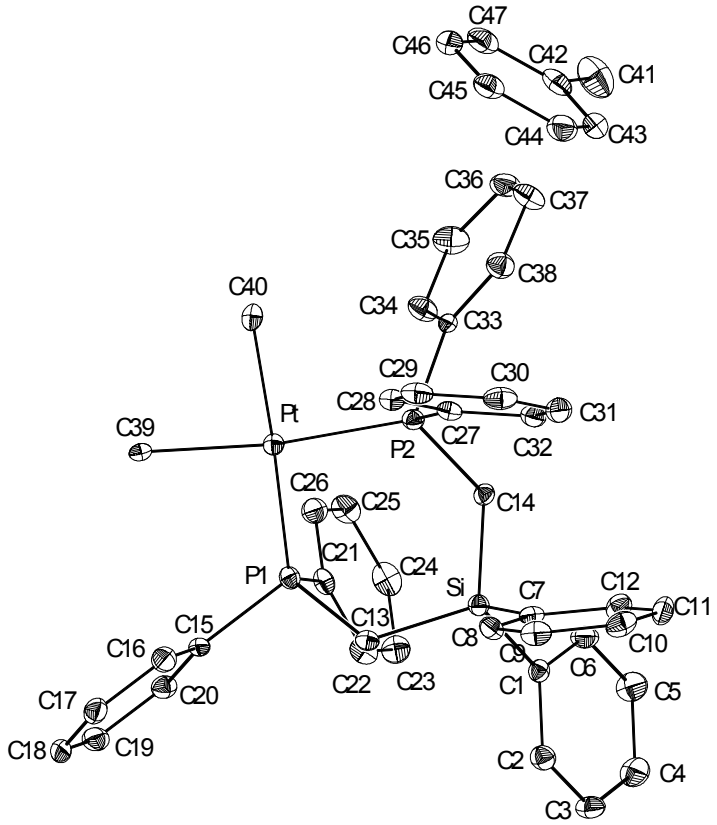


Table 3. Crystal data and structure refinement for (Ph_2SiP_2)$PtMe_2$·toluene (8·toluene).

Empirical formula	$C_{40}H_{40}P_2PtSi \cdot C_7H_8$
Formula weight	805.86 · 92.14
Crystallization Solvent	petroleum ether / toluene
Crystal Habit	Block
Crystal Color	Colorless
Crystal size	0.20 x 0.15 x 0.15 mm^3
Data Collection	
Data collection temperature	98(2) K
Unit cell dimensions	a = 12.4923(9) Å
	b = 21.3358(16) Å β= 90.0210(10)°
	c = 14.6898(11) Å
Volume	3915.3(5) $Å^3$
Z	4
Crystal system	Monoclinic
Space group	$P2_1/n$
Density (calculated)	1.523 Mg/m^3
F(000)	1808
Theta range for data collection	1.68 to 28.51°
Completeness to θ = 28.51°	95.5%
Index ranges	-16<=h<=16, -28<=k<=28, -19<=l<=19
Reflections collected	81512
Independent reflections	9476 [R(int) = 0.0728]
Absorption coefficient	3.729 mm^{-1}
Absorption correction	None
Structure solution and Refinement	
Primary solution method	Direct methods
Secondary solution method	Difference Fourier map
Hydrogen placement	Calculated
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	9476 / 0 / 463
Goodness-of-fit on F^2	1.258
Final R indices [I>2σ(I), 7698 reflections]	R1 = 0.0272, wR2 = 0.0546
R indices (all data)	R1 = 0.0402, wR2 = 0.0574
Largest diff. peak and hole	1.300 and -0.599 e.$Å^{-3}$

Table 4. Bond lengths [Å] and angles [°] for (Ph_2SiP_2)$PtMe_2$·toluene (8·toluene).

Pt-C(40)	2.122(3)	C(23)-H(23)	0.9500
Pt-C(39)	2.142(3)	C(24)-C(25)	1.393(4)
Pt-P(1)	2.2804(7)	C(24)-H(24)	0.9500
Pt-P(2)	2.2829(7)	C(25)-C(26)	1.396(4)
Pt-Si	4.1916(8)	C(25)-H(25)	0.9500
P(1)-C(15)	1.830(3)	C(26)-H(26)	0.9500
P(1)-C(21)	1.828(3)	C(27)-C(32)	1.393(4)
P(1)-C(13)	1.832(3)	C(27)-C(28)	1.391(4)
P(2)-C(27)	1.830(3)	C(28)-C(29)	1.389(4)
P(2)-C(33)	1.833(3)	C(28)-H(28)	0.9500
P(2)-C(14)	1.833(3)	C(29)-C(30)	1.383(4)
Si-C(7)	1.874(3)	C(29)-H(29)	0.9500
Si-C(1)	1.876(3)	C(30)-C(31)	1.388(4)
Si-C(14)	1.882(3)	C(30)-H(30)	0.9500
Si-C(13)	1.889(3)	C(31)-C(32)	1.385(4)
C(1)-C(6)	1.393(4)	C(31)-H(31)	0.9500
C(1)-C(2)	1.406(4)	C(32)-H(32)	0.9500
C(2)-C(3)	1.391(4)	C(33)-C(34)	1.383(4)
C(2)-H(2)	0.9500	C(33)-C(38)	1.392(4)
C(3)-C(4)	1.376(4)	C(34)-C(35)	1.392(4)
C(3)-H(3)	0.9500	C(34)-H(34)	0.9500
C(4)-C(5)	1.387(4)	C(35)-C(36)	1.375(4)
C(4)-H(4)	0.9500	C(35)-H(35)	0.9500
C(5)-C(6)	1.384(4)	C(36)-C(37)	1.379(4)
C(5)-H(5)	0.9500	C(36)-H(36)	0.9500
C(6)-H(6)	0.9500	C(37)-C(38)	1.390(4)
C(7)-C(8)	1.393(4)	C(37)-H(37)	0.9500
C(7)-C(12)	1.404(4)	C(38)-H(38)	0.9500
C(8)-C(9)	1.393(4)	C(39)-H(39A)	0.9800
C(8)-H(8)	0.9500	C(39)-H(39B)	0.9800
C(9)-C(10)	1.378(4)	C(39)-H(39C)	0.9800
C(9)-H(9)	0.9500	C(40)-H(40A)	0.9800
C(10)-C(11)	1.381(4)	C(40)-H(40B)	0.9800
C(10)-H(10)	0.9500	C(40)-H(40C)	0.9800
C(11)-C(12)	1.389(4)	C(41)-C(42)	1.508(5)
C(11)-H(11)	0.9500	C(41)-H(41A)	0.9800
C(12)-H(12)	0.9500	C(41)-H(41B)	0.9800
C(13)-H(13A)	0.9900	C(41)-H(41C)	0.9800
C(13)-H(13B)	0.9900	C(42)-C(43)	1.390(4)
C(14)-H(14A)	0.9900	C(42)-C(47)	1.397(5)
C(14)-H(14B)	0.9900	C(43)-C(44)	1.376(4)
C(15)-C(20)	1.394(4)	C(43)-H(43)	0.9500
C(15)-C(16)	1.393(4)	C(44)-C(45)	1.386(4)
C(16)-C(17)	1.388(4)	C(44)-H(44)	0.9500
C(16)-H(16)	0.9500	C(45)-C(46)	1.379(4)
C(17)-C(18)	1.392(4)	C(45)-H(45)	0.9500
C(17)-H(17)	0.9500	C(46)-C(47)	1.381(4)
C(18)-C(19)	1.380(4)	C(46)-H(46)	0.9500
C(18)-H(18)	0.9500	C(47)-H(47)	0.9500
C(19)-C(20)	1.393(4)		
C(19)-H(19)	0.9500	C(40)-Pt-C(39)	83.81(10)
C(20)-H(20)	0.9500	C(40)-Pt-P(1)	173.77(7)
C(21)-C(22)	1.395(4)	C(39)-Pt-P(1)	93.60(7)
C(21)-C(26)	1.399(4)	C(40)-Pt-P(2)	88.32(7)
C(22)-C(23)	1.399(4)	C(39)-Pt-P(2)	171.15(7)
C(22)-H(22)	0.9500	P(1)-Pt-P(2)	94.62(3)
C(23)-C(24)	1.382(4)	C(40)-Pt-Si	135.93(7)

C(39)-Pt-Si	138.53(7)	C(11)-C(12)-H(12)	119.3
P(1)-Pt-Si	48.10(2)	C(7)-C(12)-H(12)	119.3
P(2)-Pt-Si	48.36(2)	P(1)-C(13)-Si	116.38(14)
C(15)-P(1)-C(21)	105.04(13)	P(1)-C(13)-H(13A)	108.2
C(15)-P(1)-C(13)	100.54(12)	Si-C(13)-H(13A)	108.2
C(21)-P(1)-C(13)	103.97(13)	P(1)-C(13)-H(13B)	108.2
C(15)-P(1)-Pt	117.93(9)	Si-C(13)-H(13B)	108.2
C(21)-P(1)-Pt	111.51(10)	H(13A)-C(13)-H(13B)	107.3
C(13)-P(1)-Pt	116.20(9)	P(2)-C(14)-Si	117.28(14)
C(27)-P(2)-C(33)	104.50(13)	P(2)-C(14)-H(14A)	108.0
C(27)-P(2)-C(14)	103.93(13)	Si-C(14)-H(14A)	108.0
C(33)-P(2)-C(14)	100.48(12)	P(2)-C(14)-H(14B)	108.0
C(27)-P(2)-Pt	114.34(9)	Si-C(14)-H(14B)	108.0
C(33)-P(2)-Pt	114.24(9)	H(14A)-C(14)-H(14B)	107.2
C(14)-P(2)-Pt	117.56(9)	C(20)-C(15)-C(16)	118.8(3)
C(7)-Si-C(1)	106.62(12)	C(20)-C(15)-P(1)	124.6(2)
C(7)-Si-C(14)	110.34(12)	C(16)-C(15)-P(1)	116.6(2)
C(1)-Si-C(14)	107.43(12)	C(17)-C(16)-C(15)	121.2(3)
C(7)-Si-C(13)	110.16(12)	C(17)-C(16)-H(16)	119.4
C(1)-Si-C(13)	111.55(12)	C(15)-C(16)-H(16)	119.4
C(14)-Si-C(13)	110.64(12)	C(16)-C(17)-C(18)	119.6(3)
C(7)-Si-Pt	114.94(9)	C(16)-C(17)-H(17)	120.2
C(1)-Si-Pt	138.40(9)	C(18)-C(17)-H(17)	120.2
C(14)-Si-Pt	56.67(8)	C(19)-C(18)-C(17)	119.6(3)
C(13)-Si-Pt	55.85(8)	C(19)-C(18)-H(18)	120.2
C(6)-C(1)-C(2)	117.0(3)	C(17)-C(18)-H(18)	120.2
C(6)-C(1)-Si	122.8(2)	C(18)-C(19)-C(20)	120.9(3)
C(2)-C(1)-Si	120.1(2)	C(18)-C(19)-H(19)	119.6
C(3)-C(2)-C(1)	121.1(3)	C(20)-C(19)-H(19)	119.6
C(3)-C(2)-H(2)	119.4	C(19)-C(20)-C(15)	119.9(3)
C(1)-C(2)-H(2)	119.4	C(19)-C(20)-H(20)	120.0
C(4)-C(3)-C(2)	120.4(3)	C(15)-C(20)-H(20)	120.0
C(4)-C(3)-H(3)	119.8	C(22)-C(21)-C(26)	119.0(3)
C(2)-C(3)-H(3)	119.8	C(22)-C(21)-P(1)	122.0(2)
C(3)-C(4)-C(5)	119.5(3)	C(26)-C(21)-P(1)	118.9(2)
C(3)-C(4)-H(4)	120.3	C(21)-C(22)-C(23)	120.6(3)
C(5)-C(4)-H(4)	120.3	C(21)-C(22)-H(22)	119.7
C(6)-C(5)-C(4)	120.1(3)	C(23)-C(22)-H(22)	119.7
C(6)-C(5)-H(5)	119.9	C(24)-C(23)-C(22)	119.7(3)
C(4)-C(5)-H(5)	119.9	C(24)-C(23)-H(23)	120.1
C(5)-C(6)-C(1)	121.8(3)	C(22)-C(23)-H(23)	120.1
C(5)-C(6)-H(6)	119.1	C(23)-C(24)-C(25)	120.6(3)
C(1)-C(6)-H(6)	119.1	C(23)-C(24)-H(24)	119.7
C(8)-C(7)-C(12)	117.4(3)	C(25)-C(24)-H(24)	119.7
C(8)-C(7)-Si	125.1(2)	C(24)-C(25)-C(26)	119.6(3)
C(12)-C(7)-Si	117.5(2)	C(24)-C(25)-H(25)	120.2
C(7)-C(8)-C(9)	121.3(3)	C(26)-C(25)-H(25)	120.2
C(7)-C(8)-H(8)	119.4	C(25)-C(26)-C(21)	120.5(3)
C(9)-C(8)-H(8)	119.4	C(25)-C(26)-H(26)	119.7
C(10)-C(9)-C(8)	120.0(3)	C(21)-C(26)-H(26)	119.7
C(10)-C(9)-H(9)	120.0	C(32)-C(27)-C(28)	118.5(3)
C(8)-C(9)-H(9)	120.0	C(32)-C(27)-P(2)	122.6(2)
C(9)-C(10)-C(11)	120.1(3)	C(28)-C(27)-P(2)	118.9(2)
C(9)-C(10)-H(10)	120.0	C(29)-C(28)-C(27)	120.8(3)
C(11)-C(10)-H(10)	120.0	C(29)-C(28)-H(28)	119.6
C(10)-C(11)-C(12)	119.8(3)	C(27)-C(28)-H(28)	119.6
C(10)-C(11)-H(11)	120.1	C(30)-C(29)-C(28)	119.9(3)
C(12)-C(11)-H(11)	120.1	C(30)-C(29)-H(29)	120.0
C(11)-C(12)-C(7)	121.3(3)	C(28)-C(29)-H(29)	120.0

C(29)-C(30)-C(31)	119.9(3)	H(39B)-C(39)-H(39C)	109.5
C(29)-C(30)-H(30)	120.1	Pt-C(40)-H(40A)	109.5
C(31)-C(30)-H(30)	120.1	Pt-C(40)-H(40B)	109.5
C(32)-C(31)-C(30)	119.9(3)	H(40A)-C(40)-H(40B)	109.5
C(32)-C(31)-H(31)	120.0	Pt-C(40)-H(40C)	109.5
C(30)-C(31)-H(31)	120.0	H(40A)-C(40)-H(40C)	109.5
C(31)-C(32)-C(27)	120.9(3)	H(40B)-C(40)-H(40C)	109.5
C(31)-C(32)-H(32)	119.6	C(42)-C(41)-H(41A)	109.5
C(27)-C(32)-H(32)	119.6	C(42)-C(41)-H(41B)	109.5
C(34)-C(33)-C(38)	118.5(3)	H(41A)-C(41)-H(41B)	109.5
C(34)-C(33)-P(2)	117.5(2)	C(42)-C(41)-H(41C)	109.5
C(38)-C(33)-P(2)	123.9(2)	H(41A)-C(41)-H(41C)	109.5
C(33)-C(34)-C(35)	121.0(3)	H(41B)-C(41)-H(41C)	109.5
C(33)-C(34)-H(34)	119.5	C(43)-C(42)-C(47)	117.6(3)
C(35)-C(34)-H(34)	119.5	C(43)-C(42)-C(41)	121.7(3)
C(36)-C(35)-C(34)	119.8(3)	C(47)-C(42)-C(41)	120.7(3)
C(36)-C(35)-H(35)	120.1	C(44)-C(43)-C(42)	121.8(3)
C(34)-C(35)-H(35)	120.1	C(44)-C(43)-H(43)	119.1
C(37)-C(36)-C(35)	120.0(3)	C(42)-C(43)-H(43)	119.1
C(37)-C(36)-H(36)	120.0	C(43)-C(44)-C(45)	119.8(3)
C(35)-C(36)-H(36)	120.0	C(43)-C(44)-H(44)	120.1
C(36)-C(37)-C(38)	120.2(3)	C(45)-C(44)-H(44)	120.1
C(36)-C(37)-H(37)	119.9	C(46)-C(45)-C(44)	119.3(3)
C(38)-C(37)-H(37)	119.9	C(46)-C(45)-H(45)	120.4
C(33)-C(38)-C(37)	120.4(3)	C(44)-C(45)-H(45)	120.4
C(33)-C(38)-H(38)	119.8	C(45)-C(46)-C(47)	120.8(3)
C(37)-C(38)-H(38)	119.8	C(45)-C(46)-H(46)	119.6
Pt-C(39)-H(39A)	109.5	C(47)-C(46)-H(46)	119.6
Pt-C(39)-H(39B)	109.5	C(46)-C(47)-C(42)	120.6(3)
H(39A)-C(39)-H(39B)	109.5	C(46)-C(47)-H(47)	119.7
Pt-C(39)-H(39C)	109.5	C(42)-C(47)-H(47)	119.7
H(39A)-C(39)-H(39C)	109.5		

Figure 9. Fully labeled drawing of (dppp)$PtMe_2$ (**9**) (hydrogen atoms omitted).

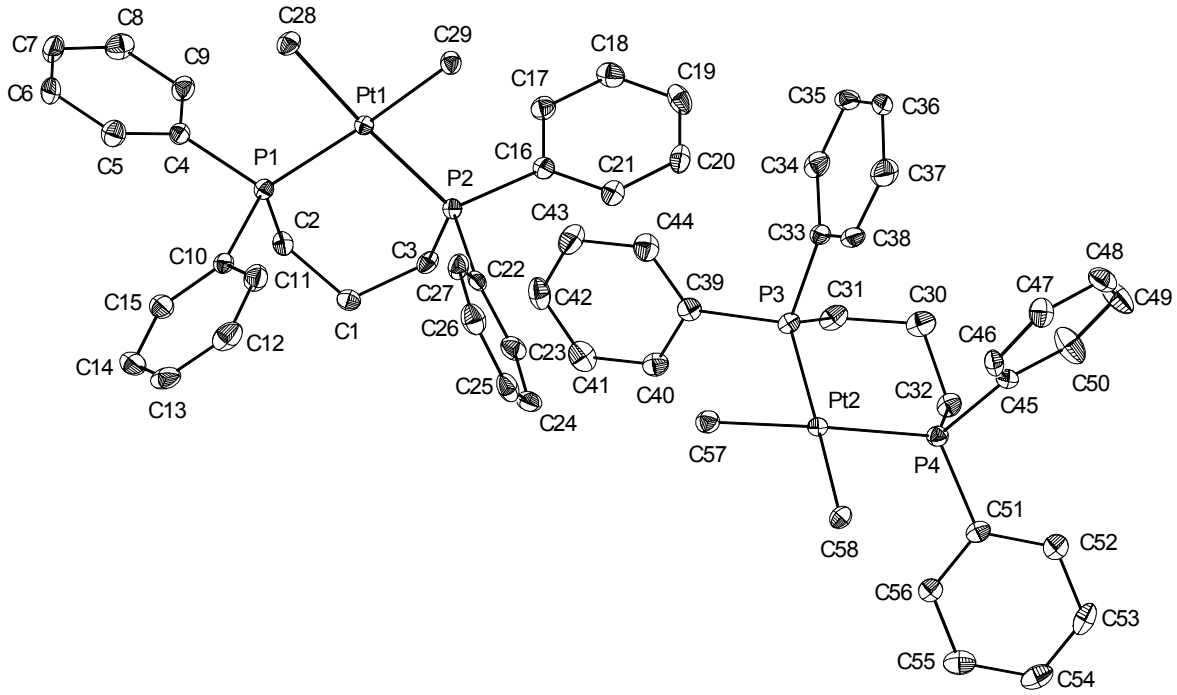


Table 5. Crystal data and structure refinement for (dppp)$PtMe_2$ (9).

Empirical formula	$C_{29}H_{32}P_2Pt$
Formula weight	637.58
Crystallization Solvent	petroleum ether / THF
Crystal Habit	Block
Crystal Color	Colorless
Crystal size	0.22 x 0.21 x 0.20 mm^3
Data Collection	
Data collection temperature	98(2) K
Unit cell dimensions	a = 15.4697(10) Å
	b = 16.0349(10) Å
	c = 20.7479(13) Å
Volume	5146.6(6) $Å^3$
Z	8
Crystal system	Orthorhombic
Space group	$P2_12_12_1$
Density (calculated)	1.646 Mg/m^3
F(000)	2512
Theta range for data collection	1.61 to 28.49°
Completeness to θ = 28.49°	96.9%
Index ranges	-20<=h<=20, -21<=k<=21, -27<=l<=27
Reflections collected	106794
Independent reflections	12411 [R(int) = 0.0544]
Absorption coefficient	5.592 mm^{-1}
Absorption correction	None
Structure solution and Refinement	
Primary solution method	Direct methods
Secondary solution method	Difference Fourier map
Hydrogen placement	Calculated
Refinement method	Full-matrix least-squares on F^2
Data / restraints / parameters	12411 / 0 / 582
Goodness-of-fit on F^2	1.235
Final R indices [I>2σ (I), 11842 reflections]	R1 = 0.0203, wR2 = 0.0446
R indices (all data)	R1 = 0.0226, wR2 = 0.0451
Absolute structure parameter	0.408(3)
Largest diff. peak and hole	1.453 and -0.612 $e.Å^{-3}$

Special refinement details

The crystal was refined as a twin, with the fractions of each crystal being refined to 0.59182 / 0.40818.

Table 6. Bond lengths [Å] and angles [°] for (dppp)$PtMe_2$ (9).

Pt(1)-C(28)	2.102(3)	C(24)-H(24)	0.9500
Pt(1)-C(29)	2.113(3)	C(25)-C(26)	1.380(5)
Pt(1)-P(2)	2.2714(8)	C(25)-H(25)	0.9500
Pt(1)-P(1)	2.2724(8)	C(26)-C(27)	1.378(5)
Pt(1)-C(1)	3.839(3)	C(26)-H(26)	0.9500
P(1)-C(10)	1.819(3)	C(27)-H(27)	0.9500
P(1)-C(4)	1.836(3)	C(28)-H(28A)	0.9800
P(1)-C(2)	1.842(3)	C(28)-H(28B)	0.9800
P(2)-C(16)	1.826(3)	C(28)-H(28C)	0.9800
P(2)-C(22)	1.831(3)	C(29)-H(29A)	0.9800
P(2)-C(3)	1.832(3)	C(29)-H(29B)	0.9800
C(1)-C(2)	1.535(4)	C(29)-H(29C)	0.9800
C(1)-C(3)	1.539(4)	Pt(2)-C(57)	2.103(3)
C(1)-H(1A)	0.9900	Pt(2)-C(58)	2.107(3)
C(1)-H(1B)	0.9900	Pt(2)-P(3)	2.2787(8)
C(2)-H(2A)	0.9900	Pt(2)-P(4)	2.2811(8)
C(2)-H(2B)	0.9900	Pt(2)-C(30)	3.874(3)
C(3)-H(3A)	0.9900	P(3)-C(33)	1.827(3)
C(3)-H(3B)	0.9900	P(3)-C(39)	1.828(3)
C(4)-C(9)	1.375(5)	P(3)-C(31)	1.841(3)
C(4)-C(5)	1.394(5)	P(4)-C(45)	1.830(3)
C(5)-C(6)	1.399(5)	P(4)-C(51)	1.830(3)
C(5)-H(5)	0.9500	P(4)-C(32)	1.830(3)
C(6)-C(7)	1.381(5)	C(30)-C(31)	1.538(5)
C(6)-H(6)	0.9500	C(30)-C(32)	1.546(5)
C(7)-C(8)	1.375(5)	C(30)-H(30A)	0.9900
C(7)-H(7)	0.9500	C(30)-H(30B)	0.9900
C(8)-C(9)	1.400(5)	C(31)-H(31A)	0.9900
C(8)-H(8)	0.9500	C(31)-H(31B)	0.9900
C(9)-H(9)	0.9500	C(32)-H(32A)	0.9900
C(10)-C(11)	1.394(5)	C(32)-H(32B)	0.9900
C(10)-C(15)	1.400(5)	C(33)-C(38)	1.389(5)
C(11)-C(12)	1.393(5)	C(33)-C(34)	1.396(5)
C(11)-H(11)	0.9500	C(34)-C(35)	1.387(5)
C(12)-C(13)	1.386(5)	C(34)-H(34)	0.9500
C(12)-H(12)	0.9500	C(35)-C(36)	1.372(6)
C(13)-C(14)	1.372(6)	C(35)-H(35)	0.9500
C(13)-H(13)	0.9500	C(36)-C(37)	1.381(5)
C(14)-C(15)	1.377(5)	C(36)-H(36)	0.9500
C(14)-H(14)	0.9500	C(37)-C(38)	1.392(5)
C(15)-H(15)	0.9500	C(37)-H(37)	0.9500
C(16)-C(21)	1.395(4)	C(38)-H(38)	0.9500
C(16)-C(17)	1.397(4)	C(39)-C(44)	1.390(5)
C(17)-C(18)	1.386(5)	C(39)-C(40)	1.394(4)
C(17)-H(17)	0.9500	C(40)-C(41)	1.371(5)
C(18)-C(19)	1.395(5)	C(40)-H(40)	0.9500
C(18)-H(18)	0.9500	C(41)-C(42)	1.402(5)
C(19)-C(20)	1.383(5)	C(41)-H(41)	0.9500
C(19)-H(19)	0.9500	C(42)-C(43)	1.382(5)
C(20)-C(21)	1.383(5)	C(42)-H(42)	0.9500
C(20)-H(20)	0.9500	C(43)-C(44)	1.396(5)
C(21)-H(21)	0.9500	C(43)-H(43)	0.9500
C(22)-C(23)	1.386(5)	C(44)-H(44)	0.9500
C(22)-C(27)	1.399(5)	C(45)-C(46)	1.389(5)
C(23)-C(24)	1.397(4)	C(45)-C(50)	1.390(5)
C(23)-H(23)	0.9500	C(46)-C(47)	1.398(4)
C(24)-C(25)	1.385(5)	C(46)-H(46)	0.9500

C(47)-C(48)	1.376(5)
C(47)-H(47)	0.9500
C(48)-C(49)	1.378(5)
C(48)-H(48)	0.9500
C(49)-C(50)	1.382(5)
C(49)-H(49)	0.9500
C(50)-H(50)	0.9500
C(51)-C(56)	1.389(4)
C(51)-C(52)	1.407(5)
C(52)-C(53)	1.381(5)
C(52)-H(52)	0.9500
C(53)-C(54)	1.389(5)
C(53)-H(53)	0.9500
C(54)-C(55)	1.396(5)
C(54)-H(54)	0.9500
C(55)-C(56)	1.391(5)
C(55)-H(55)	0.9500
C(56)-H(56)	0.9500
C(57)-H(57A)	0.9800
C(57)-H(57B)	0.9800
C(57)-H(57C)	0.9800
C(58)-H(58A)	0.9800
C(58)-H(58B)	0.9800
C(58)-H(58C)	0.9800

C(28)-Pt(1)-C(29)	86.02(13)
C(28)-Pt(1)-P(2)	175.99(10)
C(29)-Pt(1)-P(2)	89.96(9)
C(28)-Pt(1)-P(1)	89.71(10)
C(29)-Pt(1)-P(1)	174.94(9)
P(2)-Pt(1)-P(1)	94.30(3)
C(28)-Pt(1)-C(1)	136.30(11)
C(29)-Pt(1)-C(1)	137.62(10)
P(2)-Pt(1)-C(1)	47.71(5)
P(1)-Pt(1)-C(1)	46.81(5)
C(10)-P(1)-C(4)	102.78(15)
C(10)-P(1)-C(2)	100.84(15)
C(4)-P(1)-C(2)	101.68(14)
C(10)-P(1)-Pt(1)	115.26(11)
C(4)-P(1)-Pt(1)	117.58(11)
C(2)-P(1)-Pt(1)	116.25(10)
C(16)-P(2)-C(22)	104.43(14)
C(16)-P(2)-C(3)	100.50(14)
C(22)-P(2)-C(3)	104.84(15)
C(16)-P(2)-Pt(1)	116.21(10)
C(22)-P(2)-Pt(1)	112.31(11)
C(3)-P(2)-Pt(1)	116.95(10)
C(2)-C(1)-C(3)	113.3(3)
C(2)-C(1)-Pt(1)	65.78(16)
C(3)-C(1)-Pt(1)	65.94(15)
C(2)-C(1)-H(1A)	108.9
C(3)-C(1)-H(1A)	108.9
Pt(1)-C(1)-H(1A)	168.1
C(2)-C(1)-H(1B)	108.9
C(3)-C(1)-H(1B)	108.9
Pt(1)-C(1)-H(1B)	84.2
H(1A)-C(1)-H(1B)	107.7
C(1)-C(2)-P(1)	113.0(2)
C(1)-C(2)-H(2A)	109.0
P(1)-C(2)-H(2A)	109.0
C(1)-C(2)-H(2B)	109.0
P(1)-C(2)-H(2B)	109.0
H(2A)-C(2)-H(2B)	107.8
C(1)-C(3)-P(2)	115.6(2)
C(1)-C(3)-H(3A)	108.4
P(2)-C(3)-H(3A)	108.4
C(1)-C(3)-H(3B)	108.4
P(2)-C(3)-H(3B)	108.4
H(3A)-C(3)-H(3B)	107.4
C(9)-C(4)-C(5)	119.2(3)
C(9)-C(4)-P(1)	119.0(2)
C(5)-C(4)-P(1)	121.8(3)
C(4)-C(5)-C(6)	119.8(3)
C(4)-C(5)-H(5)	120.1
C(6)-C(5)-H(5)	120.1
C(7)-C(6)-C(5)	120.5(3)
C(7)-C(6)-H(6)	119.7
C(5)-C(6)-H(6)	119.7
C(8)-C(7)-C(6)	119.5(3)
C(8)-C(7)-H(7)	120.2
C(6)-C(7)-H(7)	120.2
C(7)-C(8)-C(9)	120.2(3)
C(7)-C(8)-H(8)	119.9
C(9)-C(8)-H(8)	119.9
C(4)-C(9)-C(8)	120.6(3)
C(4)-C(9)-H(9)	119.7
C(8)-C(9)-H(9)	119.7
C(11)-C(10)-C(15)	118.5(3)
C(11)-C(10)-P(1)	120.0(3)
C(15)-C(10)-P(1)	121.5(3)
C(12)-C(11)-C(10)	120.5(3)
C(12)-C(11)-H(11)	119.7
C(10)-C(11)-H(11)	119.7
C(13)-C(12)-C(11)	119.4(4)
C(13)-C(12)-H(12)	120.3
C(11)-C(12)-H(12)	120.3
C(14)-C(13)-C(12)	120.7(3)
C(14)-C(13)-H(13)	119.7
C(12)-C(13)-H(13)	119.7
C(13)-C(14)-C(15)	120.2(4)
C(13)-C(14)-H(14)	119.9
C(15)-C(14)-H(14)	119.9
C(14)-C(15)-C(10)	120.8(4)
C(14)-C(15)-H(15)	119.6
C(10)-C(15)-H(15)	119.6
C(21)-C(16)-C(17)	118.7(3)
C(21)-C(16)-P(2)	123.2(2)
C(17)-C(16)-P(2)	118.0(2)
C(18)-C(17)-C(16)	120.4(3)
C(18)-C(17)-H(17)	119.8
C(16)-C(17)-H(17)	119.8
C(17)-C(18)-C(19)	120.4(3)
C(17)-C(18)-H(18)	119.8
C(19)-C(18)-H(18)	119.8
C(20)-C(19)-C(18)	119.2(3)
C(20)-C(19)-H(19)	120.4
C(18)-C(19)-H(19)	120.4
C(19)-C(20)-C(21)	120.6(3)

C(19)-C(20)-H(20)	119.7	C(32)-C(30)-Pt(2)	64.56(16)
C(21)-C(20)-H(20)	119.7	C(31)-C(30)-H(30A)	109.0
C(20)-C(21)-C(16)	120.7(3)	C(32)-C(30)-H(30A)	109.0
C(20)-C(21)-H(21)	119.7	Pt(2)-C(30)-H(30A)	86.2
C(16)-C(21)-H(21)	119.7	C(31)-C(30)-H(30B)	109.0
C(23)-C(22)-C(27)	118.8(3)	C(32)-C(30)-H(30B)	109.0
C(23)-C(22)-P(2)	123.6(3)	Pt(2)-C(30)-H(30B)	166.0
C(27)-C(22)-P(2)	117.6(2)	H(30A)-C(30)-H(30B)	107.8
C(22)-C(23)-C(24)	120.1(3)	C(30)-C(31)-P(3)	113.7(2)
C(22)-C(23)-H(23)	120.0	C(30)-C(31)-H(31A)	108.8
C(24)-C(23)-H(23)	120.0	P(3)-C(31)-H(31A)	108.8
C(25)-C(24)-C(23)	120.5(3)	C(30)-C(31)-H(31B)	108.8
C(25)-C(24)-H(24)	119.8	P(3)-C(31)-H(31B)	108.8
C(23)-C(24)-H(24)	119.8	H(31A)-C(31)-H(31B)	107.7
C(26)-C(25)-C(24)	119.3(3)	C(30)-C(32)-P(4)	115.1(2)
C(26)-C(25)-H(25)	120.3	C(30)-C(32)-H(32A)	108.5
C(24)-C(25)-H(25)	120.3	P(4)-C(32)-H(32A)	108.5
C(27)-C(26)-C(25)	120.6(3)	C(30)-C(32)-H(32B)	108.5
C(27)-C(26)-H(26)	119.7	P(4)-C(32)-H(32B)	108.5
C(25)-C(26)-H(26)	119.7	H(32A)-C(32)-H(32B)	107.5
C(26)-C(27)-C(22)	120.7(3)	C(38)-C(33)-C(34)	118.5(3)
C(26)-C(27)-H(27)	119.6	C(38)-C(33)-P(3)	118.3(2)
C(22)-C(27)-H(27)	119.6	C(34)-C(33)-P(3)	123.1(3)
Pt(1)-C(28)-H(28A)	109.5	C(35)-C(34)-C(33)	120.7(3)
Pt(1)-C(28)-H(28B)	109.5	C(35)-C(34)-H(34)	119.6
H(28A)-C(28)-H(28B)	109.5	C(33)-C(34)-H(34)	119.6
Pt(1)-C(28)-H(28C)	109.5	C(36)-C(35)-C(34)	119.9(3)
H(28A)-C(28)-H(28C)	109.5	C(36)-C(35)-H(35)	120.0
H(28B)-C(28)-H(28C)	109.5	C(34)-C(35)-H(35)	120.0
Pt(1)-C(29)-H(29A)	109.5	C(35)-C(36)-C(37)	120.5(3)
Pt(1)-C(29)-H(29B)	109.5	C(35)-C(36)-H(36)	119.7
H(29A)-C(29)-H(29B)	109.5	C(37)-C(36)-H(36)	119.7
Pt(1)-C(29)-H(29C)	109.5	C(36)-C(37)-C(38)	119.7(4)
H(29A)-C(29)-H(29C)	109.5	C(36)-C(37)-H(37)	120.2
H(29B)-C(29)-H(29C)	109.5	C(38)-C(37)-H(37)	120.2
C(57)-Pt(2)-C(58)	87.72(13)	C(33)-C(38)-C(37)	120.7(3)
C(57)-Pt(2)-P(3)	88.95(9)	C(33)-C(38)-H(38)	119.7
C(58)-Pt(2)-P(3)	175.05(9)	C(37)-C(38)-H(38)	119.7
C(57)-Pt(2)-P(4)	178.18(9)	C(44)-C(39)-C(40)	118.5(3)
C(58)-Pt(2)-P(4)	90.55(9)	C(44)-C(39)-P(3)	123.8(2)
P(3)-Pt(2)-P(4)	92.81(3)	C(40)-C(39)-P(3)	117.8(2)
C(57)-Pt(2)-C(30)	134.76(10)	C(41)-C(40)-C(39)	121.3(3)
C(58)-Pt(2)-C(30)	137.31(10)	C(41)-C(40)-H(40)	119.3
P(3)-Pt(2)-C(30)	46.42(6)	C(39)-C(40)-H(40)	119.3
P(4)-Pt(2)-C(30)	46.92(6)	C(40)-C(41)-C(42)	119.9(3)
C(33)-P(3)-C(39)	106.19(15)	C(40)-C(41)-H(41)	120.1
C(33)-P(3)-C(31)	101.92(15)	C(42)-C(41)-H(41)	120.1
C(39)-P(3)-C(31)	99.65(14)	C(43)-C(42)-C(41)	119.6(3)
C(33)-P(3)-Pt(2)	112.56(11)	C(43)-C(42)-H(42)	120.2
C(39)-P(3)-Pt(2)	117.60(11)	C(41)-C(42)-H(42)	120.2
C(31)-P(3)-Pt(2)	116.96(11)	C(42)-C(43)-C(44)	119.9(3)
C(45)-P(4)-C(51)	106.52(15)	C(42)-C(43)-H(43)	120.1
C(45)-P(4)-C(32)	103.33(15)	C(44)-C(43)-H(43)	120.1
C(51)-P(4)-C(32)	99.00(14)	C(39)-C(44)-C(43)	120.8(3)
C(45)-P(4)-Pt(2)	112.89(11)	C(39)-C(44)-H(44)	119.6
C(51)-P(4)-Pt(2)	117.00(11)	C(43)-C(44)-H(44)	119.6
C(32)-P(4)-Pt(2)	116.32(11)	C(46)-C(45)-C(50)	118.4(3)
C(31)-C(30)-C(32)	112.8(3)	C(46)-C(45)-P(4)	118.6(2)
C(31)-C(30)-Pt(2)	65.23(17)	C(50)-C(45)-P(4)	122.9(3)

C(45)-C(46)-C(47)	120.4(3)	C(54)-C(53)-H(53)	119.9
C(45)-C(46)-H(46)	119.8	C(53)-C(54)-C(55)	119.7(3)
C(47)-C(46)-H(46)	119.8	C(53)-C(54)-H(54)	120.1
C(48)-C(47)-C(46)	120.1(3)	C(55)-C(54)-H(54)	120.1
C(48)-C(47)-H(47)	119.9	C(56)-C(55)-C(54)	120.0(3)
C(46)-C(47)-H(47)	119.9	C(56)-C(55)-H(55)	120.0
C(47)-C(48)-C(49)	119.8(3)	C(54)-C(55)-H(55)	120.0
C(47)-C(48)-H(48)	120.1	C(51)-C(56)-C(55)	120.5(3)
C(49)-C(48)-H(48)	120.1	C(51)-C(56)-H(56)	119.7
C(48)-C(49)-C(50)	120.2(4)	C(55)-C(56)-H(56)	119.7
C(48)-C(49)-H(49)	119.9	Pt(2)-C(57)-H(57A)	109.5
C(50)-C(49)-H(49)	119.9	Pt(2)-C(57)-H(57B)	109.5
C(49)-C(50)-C(45)	121.0(3)	H(57A)-C(57)-H(57B)	109.5
C(49)-C(50)-H(50)	119.5	Pt(2)-C(57)-H(57C)	109.5
C(45)-C(50)-H(50)	119.5	H(57A)-C(57)-H(57C)	109.5
C(56)-C(51)-C(52)	119.0(3)	H(57B)-C(57)-H(57C)	109.5
C(56)-C(51)-P(4)	117.9(2)	Pt(2)-C(58)-H(58A)	109.5
C(52)-C(51)-P(4)	122.9(3)	Pt(2)-C(58)-H(58B)	109.5
C(53)-C(52)-C(51)	120.4(3)	H(58A)-C(58)-H(58B)	109.5
C(53)-C(52)-H(52)	119.8	Pt(2)-C(58)-H(58C)	109.5
C(51)-C(52)-H(52)	119.8	H(58A)-C(58)-H(58C)	109.5
C(52)-C(53)-C(54)	120.3(3)	H(58B)-C(58)-H(58C)	109.5
C(52)-C(53)-H(53)	119.9		

Figure 10. Fully labeled drawing of $[Ph_2BP_2]Pt(Me)(THF)\cdot 2THF$ (**13·2THF**) (hydrogen atoms omitted).

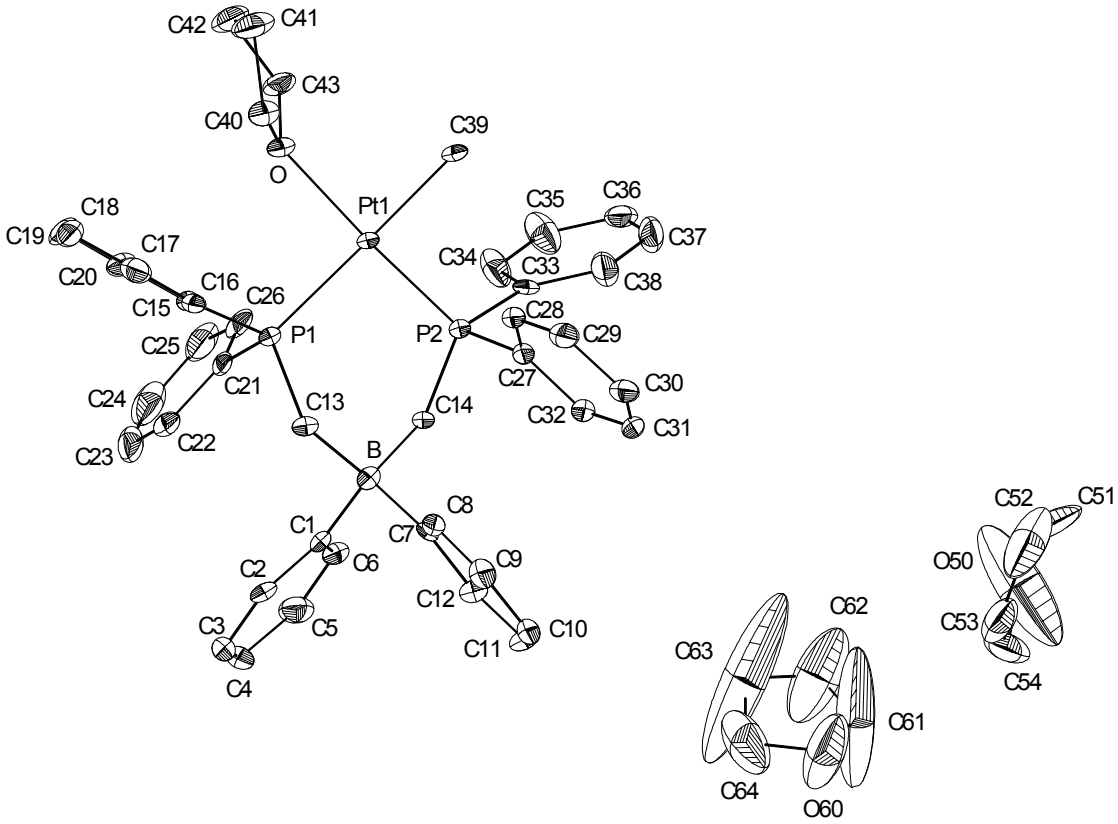


Table 7. Crystal data and structure refinement for $[Ph_2BP_2]Pt(Me)(THF)\cdot 2THF$ (13·2THF).

Empirical formula	$C_{43}H_{45}BOP_2Pt \cdot 2OC_4H_8$	
Formula weight	989.84	
Crystallization Solvent	THF	
Crystal Habit	Rhomboidal	
Crystal size	0.14 x 0.14 x 0.08 mm^3	
Crystal color	Colorless	
Data Collection		
Data Collection Temperature	98(2) K	
Unit cell dimensions	a = 12.210(4) Å	α= 109.614(5)°
	b = 12.803(4) Å	β= 104.361(5)°
	c = 16.205(5) Å	γ = 96.489(5)°
Volume	2257.6(12) $Å^3$	
Z	2	
Crystal system	Triclinic	
Space group	$P\bar{1}$ (#2)	
Density (calculated)	1.456 Mg/m^3	
F(000)	1008	
θ range for data collection	1.40 to 28.46°	
Completeness to θ = 28.46°	91.6%	
Index ranges	$-16 \le h \le 16$, $-16 \le k \le 17$, $-21 \le l \le 20$	
Reflections collected	33738	
Independent reflections	10448 [R_{int}= 0.0819]	
Absorption coefficient	3.220 mm^{-1}	
Absorption correction	None	
Structure solution and Refinement		
Primary solution method	Patterson method	
Secondary solution method	Difference Fourier map	
Hydrogen placement	Calculated	
Refinement method	Full matrix least-squares on F^2	
Data / restraints / parameters	10448 / 0 / 523	
Treatment of hydrogen atoms	Riding	
Goodness-of-fit on F^2	1.216	
Final R indices [I>2σ(I), 8047 reflections]	R1 = 0.0422, *w*R2 = 0.0789	
R indices (all data)	R1 = 0.0624, *w*R2 = 0.0822	
Type of weighting scheme used	Sigma	
Weighting scheme used	$w=1/\sigma^2(Fo^2)$	
Largest diff. peak and hole	1.949 and -1.545 e.$Å^{-3}$	

Special Refinement Details

Solvent THF molecules contained significant disorder.

Table 8. Bond lengths [Å] and angles [°] for $[Ph_2BP_2]Pt(Me)(THF)\cdot 2THF$ (13·2THF).

Pt(1)-C(39)	2.084(4)	C(23)-C(24)	1.374(10)
Pt(1)-O	2.164(3)	C(23)-H(23)	0.9500
Pt(1)-P(2)	2.1932(12)	C(24)-C(25)	1.378(9)
Pt(1)-P(1)	2.3138(13)	C(24)-H(24)	0.9500
P(1)-C(13)	1.806(5)	C(25)-C(26)	1.380(7)
P(1)-C(21)	1.807(5)	C(25)-H(25)	0.9500
P(1)-C(15)	1.826(5)	C(26)-H(26)	0.9500
P(2)-C(14)	1.791(4)	C(27)-C(28)	1.393(7)
P(2)-C(27)	1.807(5)	C(27)-C(32)	1.400(6)
P(2)-C(33)	1.820(5)	C(28)-C(29)	1.381(7)
B-C(1)	1.640(7)	C(28)-H(28)	0.9500
B-C(7)	1.656(7)	C(29)-C(30)	1.391(6)
B-C(14)	1.659(7)	C(29)-H(29)	0.9500
B-C(13)	1.672(7)	C(30)-C(31)	1.375(8)
C(1)-C(6)	1.381(7)	C(30)-H(30)	0.9500
C(1)-C(2)	1.404(6)	C(31)-C(32)	1.380(7)
C(2)-C(3)	1.392(6)	C(31)-H(31)	0.9500
C(2)-H(2)	0.9500	C(32)-H(32)	0.9500
C(3)-C(4)	1.371(7)	C(33)-C(38)	1.384(7)
C(3)-H(3)	0.9500	C(33)-C(34)	1.386(7)
C(4)-C(5)	1.369(6)	C(34)-C(35)	1.380(7)
C(4)-H(4)	0.9500	C(34)-H(34)	0.9500
C(5)-C(6)	1.385(7)	C(35)-C(36)	1.378(7)
C(5)-H(5)	0.9500	C(35)-H(35)	0.9500
C(6)-H(6)	0.9500	C(36)-C(37)	1.341(8)
C(7)-C(8)	1.376(7)	C(36)-H(36)	0.9500
C(7)-C(12)	1.402(6)	C(37)-C(38)	1.374(8)
C(8)-C(9)	1.406(7)	C(37)-H(37)	0.9500
C(8)-H(8)	0.9500	C(38)-H(38)	0.9500
C(9)-C(10)	1.402(7)	C(39)-H(39A)	0.9800
C(9)-H(9)	0.9500	C(39)-H(39B)	0.9800
C(10)-C(11)	1.365(7)	C(39)-H(39C)	0.9800
C(10)-H(10)	0.9500	O-C(40)	1.451(6)
C(11)-C(12)	1.391(7)	O-C(43)	1.454(6)
C(11)-H(11)	0.9500	C(40)-C(41)	1.507(7)
C(12)-H(12)	0.9500	C(40)-H(40A)	0.9900
C(13)-H(13A)	0.9900	C(40)-H(40B)	0.9900
C(13)-H(13B)	0.9900	C(41)-C(42)	1.497(7)
C(14)-H(14A)	0.9900	C(41)-H(41A)	0.9900
C(14)-H(14B)	0.9900	C(41)-H(41B)	0.9900
C(15)-C(16)	1.372(7)	C(42)-C(43)	1.507(6)
C(15)-C(20)	1.398(6)	C(42)-H(42A)	0.9900
C(16)-C(17)	1.386(6)	C(42)-H(42B)	0.9900
C(16)-H(16)	0.9500	C(43)-H(43A)	0.9900
C(17)-C(18)	1.396(6)	C(43)-H(43B)	0.9900
C(17)-H(17)	0.9500	O(50)-C(54)	1.380(15)
C(18)-C(19)	1.379(7)	O(50)-C(51)	1.395(14)
C(18)-H(18)	0.9500	C(51)-C(52)	1.400(13)
C(19)-C(20)	1.388(6)	C(51)-H(51A)	0.9900
C(19)-H(19)	0.9500	C(51)-H(51B)	0.9900
C(20)-H(20)	0.9500	C(52)-C(53)	1.389(12)
C(21)-C(22)	1.388(7)	C(52)-H(52A)	0.9900
C(21)-C(26)	1.398(7)	C(52)-H(52B)	0.9900
C(22)-C(23)	1.380(9)	C(53)-C(54)	1.278(12)
C(22)-H(22)	0.9500	C(53)-H(53A)	0.9900

C(53)-H(53B)	0.9900	C(1)-C(6)-C(5)	122.7(5)
C(54)-H(54A)	0.9900	C(1)-C(6)-H(6)	118.6
C(54)-H(54B)	0.9900	C(5)-C(6)-H(6)	118.6
O(60)-C(61)	1.368(12)	C(8)-C(7)-C(12)	115.6(4)
O(60)-C(64)	1.373(9)	C(8)-C(7)-B	125.6(4)
C(61)-C(62)	1.167(12)	C(12)-C(7)-B	118.8(5)
C(61)-C(63)	1.976(15)	C(7)-C(8)-C(9)	123.2(5)
C(61)-H(61A)	0.9900	C(7)-C(8)-H(8)	118.4
C(61)-H(61B)	0.9900	C(9)-C(8)-H(8)	118.4
C(62)-C(63)	1.398(15)	C(10)-C(9)-C(8)	118.9(5)
C(62)-H(62A)	0.9900	C(10)-C(9)-H(9)	120.5
C(62)-H(62B)	0.9900	C(8)-C(9)-H(9)	120.5
C(63)-C(64)	1.441(19)	C(11)-C(10)-C(9)	119.3(5)
C(63)-H(63A)	0.9900	C(11)-C(10)-H(10)	120.4
C(63)-H(63B)	0.9900	C(9)-C(10)-H(10)	120.4
C(64)-H(64A)	0.9900	C(10)-C(11)-C(12)	120.2(5)
C(64)-H(64B)	0.9900	C(10)-C(11)-H(11)	119.9
		C(12)-C(11)-H(11)	119.9
C(39)-Pt(1)-O	87.55(14)	C(11)-C(12)-C(7)	122.8(5)
C(39)-Pt(1)-P(2)	89.69(12)	C(11)-C(12)-H(12)	118.6
O-Pt(1)-P(2)	174.26(10)	C(7)-C(12)-H(12)	118.6
C(39)-Pt(1)-P(1)	174.89(16)	B-C(13)-P(1)	114.3(4)
O-Pt(1)-P(1)	91.12(9)	B-C(13)-H(13A)	108.7
P(2)-Pt(1)-P(1)	92.06(4)	P(1)-C(13)-H(13A)	108.7
C(13)-P(1)-C(21)	107.4(2)	B-C(13)-H(13B)	108.7
C(13)-P(1)-C(15)	106.7(2)	P(1)-C(13)-H(13B)	108.7
C(21)-P(1)-C(15)	103.2(2)	H(13A)-C(13)-H(13B)	107.6
C(13)-P(1)-Pt(1)	111.08(16)	B-C(14)-P(2)	118.9(4)
C(21)-P(1)-Pt(1)	118.69(18)	B-C(14)-H(14A)	107.6
C(15)-P(1)-Pt(1)	108.94(15)	P(2)-C(14)-H(14A)	107.6
C(14)-P(2)-C(27)	107.1(2)	B-C(14)-H(14B)	107.6
C(14)-P(2)-C(33)	106.8(2)	P(2)-C(14)-H(14B)	107.6
C(27)-P(2)-C(33)	104.5(2)	H(14A)-C(14)-H(14B)	107.0
C(14)-P(2)-Pt(1)	114.28(14)	C(16)-C(15)-C(20)	118.6(4)
C(27)-P(2)-Pt(1)	115.49(17)	C(16)-C(15)-P(1)	119.5(3)
C(33)-P(2)-Pt(1)	107.93(14)	C(20)-C(15)-P(1)	121.7(4)
C(1)-B-C(7)	106.0(4)	C(15)-C(16)-C(17)	121.2(4)
C(1)-B-C(14)	109.0(4)	C(15)-C(16)-H(16)	119.4
C(7)-B-C(14)	109.6(4)	C(17)-C(16)-H(16)	119.4
C(1)-B-C(13)	110.3(4)	C(16)-C(17)-C(18)	120.1(5)
C(7)-B-C(13)	109.9(4)	C(16)-C(17)-H(17)	119.9
C(14)-B-C(13)	112.0(4)	C(18)-C(17)-H(17)	119.9
C(6)-C(1)-C(2)	115.2(4)	C(19)-C(18)-C(17)	119.0(5)
C(6)-C(1)-B	124.2(4)	C(19)-C(18)-H(18)	120.5
C(2)-C(1)-B	120.4(5)	C(17)-C(18)-H(18)	120.5
C(3)-C(2)-C(1)	122.2(5)	C(18)-C(19)-C(20)	120.4(4)
C(3)-C(2)-H(2)	118.9	C(18)-C(19)-H(19)	119.8
C(1)-C(2)-H(2)	118.9	C(20)-C(19)-H(19)	119.8
C(4)-C(3)-C(2)	120.3(5)	C(19)-C(20)-C(15)	120.6(5)
C(4)-C(3)-H(3)	119.9	C(19)-C(20)-H(20)	119.7
C(2)-C(3)-H(3)	119.9	C(15)-C(20)-H(20)	119.7
C(5)-C(4)-C(3)	118.7(5)	C(22)-C(21)-C(26)	117.9(5)
C(5)-C(4)-H(4)	120.6	C(22)-C(21)-P(1)	120.8(5)
C(3)-C(4)-H(4)	120.6	C(26)-C(21)-P(1)	121.3(4)
C(4)-C(5)-C(6)	120.8(5)	C(23)-C(22)-C(21)	120.4(6)
C(4)-C(5)-H(5)	119.6	C(23)-C(22)-H(22)	119.8
C(6)-C(5)-H(5)	119.6	C(21)-C(22)-H(22)	119.8

C(24)-C(23)-C(22)	119.9(6)	O-C(40)-C(41)	106.1(4)
C(24)-C(23)-H(23)	120.1	O-C(40)-H(40A)	110.5
C(22)-C(23)-H(23)	120.1	C(41)-C(40)-H(40A)	110.5
C(23)-C(24)-C(25)	121.7(6)	O-C(40)-H(40B)	110.5
C(23)-C(24)-H(24)	119.1	C(41)-C(40)-H(40B)	110.5
C(25)-C(24)-H(24)	119.1	H(40A)-C(40)-H(40B)	108.7
C(24)-C(25)-C(26)	117.7(7)	C(42)-C(41)-C(40)	104.3(4)
C(24)-C(25)-H(25)	121.2	C(42)-C(41)-H(41A)	110.9
C(26)-C(25)-H(25)	121.2	C(40)-C(41)-H(41A)	110.9
C(25)-C(26)-C(21)	122.3(5)	C(42)-C(41)-H(41B)	110.9
C(25)-C(26)-H(26)	118.8	C(40)-C(41)-H(41B)	110.9
C(21)-C(26)-H(26)	118.8	H(41A)-C(41)-H(41B)	108.9
C(28)-C(27)-C(32)	118.9(4)	C(41)-C(42)-C(43)	101.9(4)
C(28)-C(27)-P(2)	120.9(3)	C(41)-C(42)-H(42A)	111.4
C(32)-C(27)-P(2)	120.2(4)	C(43)-C(42)-H(42A)	111.4
C(29)-C(28)-C(27)	120.5(4)	C(41)-C(42)-H(42B)	111.4
C(29)-C(28)-H(28)	119.8	C(43)-C(42)-H(42B)	111.4
C(27)-C(28)-H(28)	119.8	H(42A)-C(42)-H(42B)	109.2
C(28)-C(29)-C(30)	120.2(5)	O-C(43)-C(42)	105.1(4)
C(28)-C(29)-H(29)	119.9	O-C(43)-H(43A)	110.7
C(30)-C(29)-H(29)	119.9	C(42)-C(43)-H(43A)	110.7
C(31)-C(30)-C(29)	119.5(5)	O-C(43)-H(43B)	110.7
C(31)-C(30)-H(30)	120.3	C(42)-C(43)-H(43B)	110.7
C(29)-C(30)-H(30)	120.3	H(43A)-C(43)-H(43B)	108.8
C(30)-C(31)-C(32)	121.0(5)	C(54)-O(50)-C(51)	104.4(9)
C(30)-C(31)-H(31)	119.5	O(50)-C(51)-C(52)	106.6(8)
C(32)-C(31)-H(31)	119.5	O(50)-C(51)-H(51A)	110.4
C(31)-C(32)-C(27)	119.9(5)	C(52)-C(51)-H(51A)	110.4
C(31)-C(32)-H(32)	120.0	O(50)-C(51)-H(51B)	110.4
C(27)-C(32)-H(32)	120.0	C(52)-C(51)-H(51B)	110.4
C(38)-C(33)-C(34)	117.4(5)	H(51A)-C(51)-H(51B)	108.6
C(38)-C(33)-P(2)	123.8(5)	C(53)-C(52)-C(51)	105.3(7)
C(34)-C(33)-P(2)	118.7(3)	C(53)-C(52)-H(52A)	110.7
C(35)-C(34)-C(33)	121.0(5)	C(51)-C(52)-H(52A)	110.7
C(35)-C(34)-H(34)	119.5	C(53)-C(52)-H(52B)	110.7
C(33)-C(34)-H(34)	119.5	C(51)-C(52)-H(52B)	110.7
C(36)-C(35)-C(34)	119.8(6)	H(52A)-C(52)-H(52B)	108.8
C(36)-C(35)-H(35)	120.1	C(54)-C(53)-C(52)	109.5(8)
C(34)-C(35)-H(35)	120.1	C(54)-C(53)-H(53A)	109.8
C(37)-C(36)-C(35)	119.7(5)	C(52)-C(53)-H(53A)	109.8
C(37)-C(36)-H(36)	120.1	C(54)-C(53)-H(53B)	109.8
C(35)-C(36)-H(36)	120.1	C(52)-C(53)-H(53B)	109.8
C(36)-C(37)-C(38)	121.1(5)	H(53A)-C(53)-H(53B)	108.2
C(36)-C(37)-H(37)	119.5	C(53)-C(54)-O(50)	109.9(8)
C(38)-C(37)-H(37)	119.5	C(53)-C(54)-H(54A)	109.7
C(37)-C(38)-C(33)	121.0(6)	O(50)-C(54)-H(54A)	109.7
C(37)-C(38)-H(38)	119.5	C(53)-C(54)-H(54B)	109.7
C(33)-C(38)-H(38)	119.5	O(50)-C(54)-H(54B)	109.7
Pt(1)-C(39)-H(39A)	109.5	H(54A)-C(54)-H(54B)	108.2
Pt(1)-C(39)-H(39B)	109.5	C(61)-O(60)-C(64)	101.3(8)
H(39A)-C(39)-H(39B)	109.5	C(62)-C(61)-O(60)	122.4(11)
Pt(1)-C(39)-H(39C)	109.5	C(62)-C(61)-C(63)	44.1(8)
H(39A)-C(39)-H(39C)	109.5	O(60)-C(61)-C(63)	78.3(7)
H(39B)-C(39)-H(39C)	109.5	C(62)-C(61)-H(61A)	106.7
C(40)-O-C(43)	108.6(3)	O(60)-C(61)-H(61A)	106.7
C(40)-O-Pt(1)	121.4(3)	C(63)-C(61)-H(61A)	126.8
C(43)-O-Pt(1)	118.0(3)	C(62)-C(61)-H(61B)	106.7

O(60)-C(61)-H(61B)	106.7	C(64)-C(63)-H(63A)	109.8
C(63)-C(61)-H(61B)	122.9	C(61)-C(63)-H(63A)	130.8
H(61A)-C(61)-H(61B)	106.6	C(62)-C(63)-H(63B)	109.8
C(61)-C(62)-C(63)	100.3(12)	C(64)-C(63)-H(63B)	109.8
C(61)-C(62)-H(62A)	111.7	C(61)-C(63)-H(63B)	116.0
C(63)-C(62)-H(62A)	111.7	H(63A)-C(63)-H(63B)	108.2
C(61)-C(62)-H(62B)	111.7	O(60)-C(64)-C(63)	100.5(8)
C(63)-C(62)-H(62B)	111.7	O(60)-C(64)-H(64A)	111.7
H(62A)-C(62)-H(62B)	109.5	C(63)-C(64)-H(64A)	111.7
C(62)-C(63)-C(64)	109.5(11)	O(60)-C(64)-H(64B)	111.7
C(62)-C(63)-C(61)	35.5(6)	C(63)-C(64)-H(64B)	111.7
C(64)-C(63)-C(61)	74.8(7)	H(64A)-C(64)-H(64B)	109.4
C(62)-C(63)-H(63A)	109.8		

Figure 11. Fully labled drawing of [{(Ph_2SiP_2)Pt}$_2$(μ-η^3:η^3-biphenyl)][$B(C_6F_5)_4$]$_2$·4(*o*-xylene) (**19·4(*o*-xylene)**) (anions, solvent molecules, and hydrogen atoms omitted).

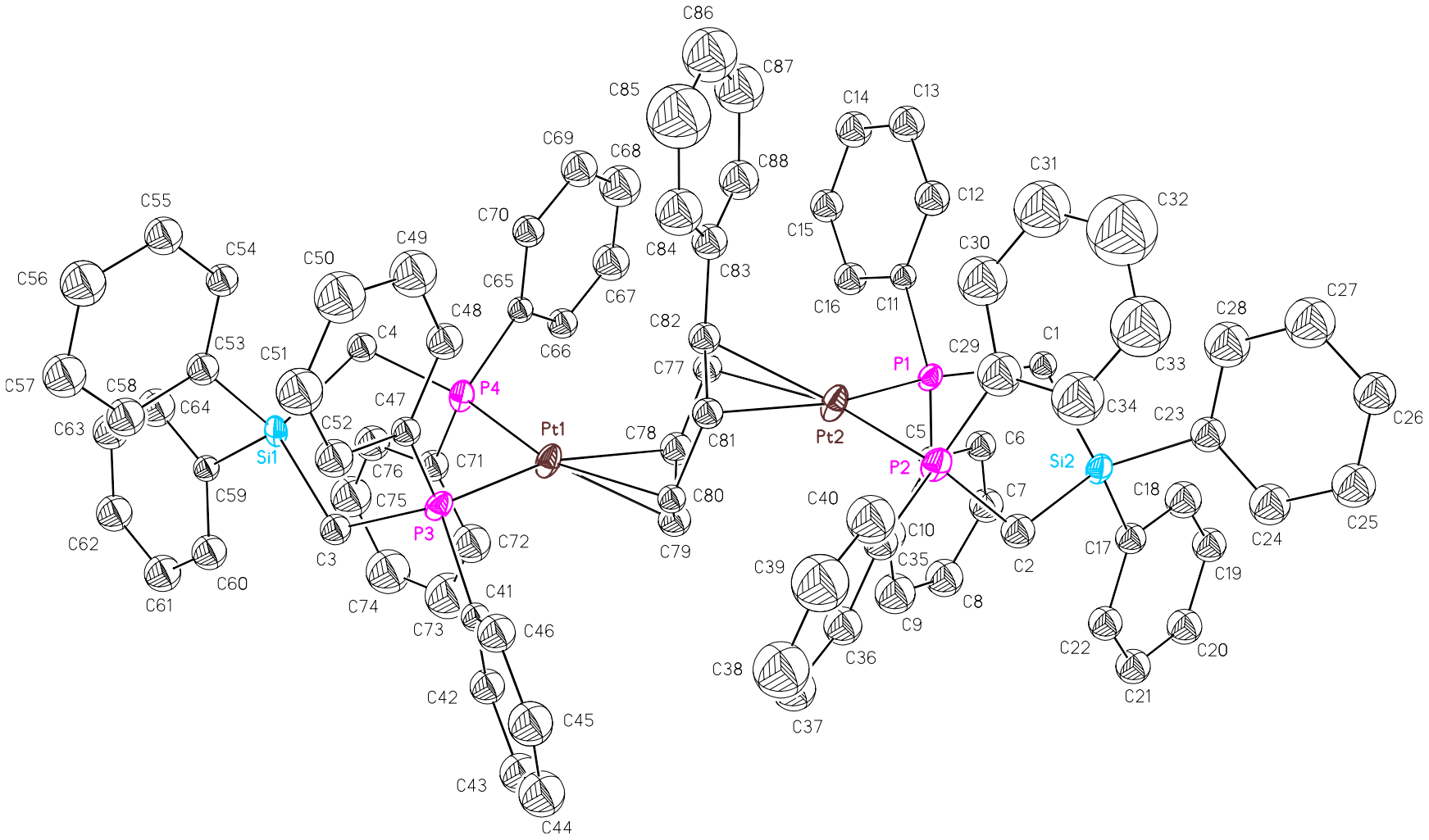


Table 9. Crystal data and structure refinement for [{(Ph_2SiP_2)Pt}$_2$(μ-η^3:η^3-biphenyl)][$B(C_6F_5)_4$]$_2$·4(*o*-xylene) (19·4(*o*-xylene)).

Empirical formula	$[C_{88}H_{78}P_4Si_2Pt_2]^{-2}$ $2[B(C_6F_5)_4]^+ \cdot 4(C_8H_{10})$	
Formula weight	3488.48	
Crystallization Solvent	*o*-xylene	
Crystal Habit	Block	
Crystal size	0.35 x 0.19 x 0.11 mm^3	
Crystal color	Orange/yellow	
Data Collection		
Data Collection Temperature	98(2) K	
Unit cell dimensions	a = 15.3609(8) Å	α= 93.2810(10)°
	b = 17.3619(9) Å	β= 95.3780(10)°
	c = 32.5391(17) Å	γ = 105.2860(10)°
Volume	8303.7(7) Å^3	
Z	2	
Crystal system	Triclinic	
Space group	P$\bar{1}$ (#2)	
Density (calculated)	1.395 Mg/m^3	
F(000)	3480	
θ range for data collection	1.42 to 28.44°	
Completeness to θ = 28.44°	91.7%	
Index ranges	$-20 \le h \le 20$, $-23 \le k \le 23$, $-43 \le l \le 43$	
Reflections collected	170727	
Independent reflections	38412 [R_{int}= 0.0832]	
Absorption coefficient	1.829 mm^{-1}	
Absorption correction	None	
Max. and min. transmission	0.8241 and 0.5669	
Structure solution and Refinement		
Primary solution method	Direct methods	
Secondary solution method	Difference Fourier map	
Hydrogen placement	Geometric positions	
Refinement method	Full matrix least-squares on F^2	
Data / restraints / parameters	38412 / 0 / 512	
Treatment of hydrogen atoms	Riding	
Goodness-of-fit on F^2	4.558	
Final R indices [I>2σ(I), 27475 reflections]	R1 = 0.1267, *w*R2 = 0.2483	
R indices (all data)	R1 = 0.1675, *w*R2 = 0.2521	
Type of weighting scheme used	Sigma	
Weighting scheme used	$w=1/\sigma^2(Fo^2)$	
Extinction coefficient	0.00034(6)	
Largest diff. peak and hole	8.385 and -5.784 e.Å^{-3}	

Special Refinement Details

It was necessary to place a number of restraints on the model in order to perform least squares refinement. All hydrogen atoms were included as riding atoms. The crystals contained solvent of crystallization, *o*-xylene, and the asymmetric unit contains four of these molecules. Each of the four were refined as rigid bodies with idealized geometry. For three of the four, a singled overall temperature factor and occupancy factor was refined for each molecule (see Table 2). All six member carbon rings in the molecule and the counterions were refined with idealized geometry with the exception of the bound ring of the bi-phenyl ligand; no restraints were placed on these carbon atoms. Only platinum, phosphorous and silicon were refined using anisotropic displacement parameters; all other atoms were refined isotropically. Residual electron density in the final Fourier map is concentrated near platinum or silicon and in the solvent region.

Table 10. Bond lengths [Å] and angles [°] for [{(Ph_2SiP_2)Pt}$_2$(μ-η^3:η^3-biphenyl)][$B(C_6F_5)_4$]$_2$·4(*o*-xylene) (19·4(*o*-xylene)).

Pt(1)-C(79)	2.119(13)	C(13)-H(13)	0.9500
Pt(1)-P(3)	2.252(3)	C(14)-C(15)	1.3900
Pt(1)-P(4)	2.262(3)	C(14)-H(14)	0.9500
Pt(1)-C(80)	2.263(12)	C(15)-C(16)	1.3900
Pt(1)-C(78)	2.280(13)	C(15)-H(15)	0.9500
Pt(2)-C(82)	2.195(12)	C(16)-H(16)	0.9500
Pt(2)-C(81)	2.240(12)	C(17)-C(18)	1.3900
Pt(2)-P(2)	2.268(3)	C(17)-C(22)	1.3900
Pt(2)-P(1)	2.270(3)	C(18)-C(19)	1.3900
Pt(2)-C(77)	2.293(12)	C(18)-H(18)	0.9500
P(1)-C(1)	1.810(12)	C(19)-C(20)	1.3900
P(1)-C(5)	1.823(7)	C(19)-H(19)	0.9500
P(1)-C(11)	1.851(6)	C(20)-C(21)	1.3900
P(2)-C(2)	1.791(12)	C(20)-H(20)	0.9500
P(2)-C(35)	1.816(7)	C(21)-C(22)	1.3900
P(2)-C(29)	1.828(9)	C(21)-H(21)	0.9500
P(3)-C(47)	1.770(7)	C(22)-H(22)	0.9500
P(3)-C(3)	1.805(12)	C(23)-C(24)	1.3900
P(3)-C(41)	1.815(6)	C(23)-C(28)	1.3900
P(4)-C(71)	1.795(7)	C(24)-C(25)	1.3900
P(4)-C(65)	1.801(6)	C(24)-H(24)	0.9500
P(4)-C(4)	1.806(12)	C(25)-C(26)	1.3900
Si(1)-C(59)	1.862(7)	C(25)-H(25)	0.9500
Si(1)-C(3)	1.876(12)	C(26)-C(27)	1.3900
Si(1)-C(53)	1.897(7)	C(26)-H(26)	0.9500
Si(1)-C(4)	1.945(12)	C(27)-C(28)	1.3900
Si(2)-C(2)	1.876(13)	C(27)-H(27)	0.9500
Si(2)-C(1)	1.892(12)	C(28)-H(28)	0.9500
Si(2)-C(17)	1.895(7)	C(29)-C(30)	1.3900
Si(2)-C(23)	1.898(7)	C(29)-C(34)	1.3900
C(1)-H(1A)	0.9900	C(30)-C(31)	1.3900
C(1)-H(1B)	0.9900	C(30)-H(30)	0.9500
C(2)-H(2A)	0.9900	C(31)-C(32)	1.3900
C(2)-H(2B)	0.9900	C(31)-H(31)	0.9500
C(3)-H(3A)	0.9900	C(32)-C(33)	1.3900
C(3)-H(3B)	0.9900	C(32)-H(32)	0.9500
C(4)-H(4A)	0.9900	C(33)-C(34)	1.3900
C(4)-H(4B)	0.9900	C(33)-H(33)	0.9500
C(5)-C(6)	1.3900	C(34)-H(34)	0.9500
C(5)-C(10)	1.3900	C(35)-C(36)	1.3900
C(6)-C(7)	1.3900	C(35)-C(40)	1.3900
C(6)-H(6)	0.9500	C(36)-C(37)	1.3900
C(7)-C(8)	1.3900	C(36)-H(36)	0.9500
C(7)-H(7)	0.9500	C(37)-C(38)	1.3900
C(8)-C(9)	1.3900	C(37)-H(37)	0.9500
C(8)-H(8)	0.9500	C(38)-C(39)	1.3900
C(9)-C(10)	1.3900	C(38)-H(38)	0.9500
C(9)-H(9)	0.9500	C(39)-C(40)	1.3900
C(10)-H(10)	0.9500	C(39)-H(39)	0.9500
C(11)-C(12)	1.3900	C(40)-H(40)	0.9500
C(11)-C(16)	1.3900	C(41)-C(42)	1.3900
C(12)-C(13)	1.3900	C(41)-C(46)	1.3900
C(12)-H(12)	0.9500	C(42)-C(43)	1.3900
C(13)-C(14)	1.3900	C(42)-H(42)	0.9500

C(43)-C(44)	1.3900	C(74)-C(75)	1.3900
C(43)-H(43)	0.9500	C(74)-H(74)	0.9500
C(44)-C(45)	1.3900	C(75)-C(76)	1.3900
C(44)-H(44)	0.9500	C(75)-H(75)	0.9500
C(45)-C(46)	1.3900	C(76)-H(76)	0.9500
C(45)-H(45)	0.9500	C(77)-C(78)	1.377(16)
C(46)-H(46)	0.9500	C(77)-C(82)	1.486(16)
C(47)-C(48)	1.3900	C(77)-H(77)	1.0000
C(47)-C(52)	1.3900	C(78)-C(79)	1.459(17)
C(48)-C(49)	1.3900	C(78)-H(78)	1.0000
C(48)-H(48)	0.9500	C(79)-C(80)	1.404(16)
C(49)-C(50)	1.3900	C(79)-H(79)	1.0000
C(49)-H(49)	0.9500	C(80)-C(81)	1.407(16)
C(50)-C(51)	1.3900	C(80)-H(80)	1.0000
C(50)-H(50)	0.9500	C(81)-C(82)	1.438(16)
C(51)-C(52)	1.3900	C(81)-H(81)	1.0000
C(51)-H(51)	0.9500	C(82)-C(83)	1.466(14)
C(52)-H(52)	0.9500	C(83)-C(84)	1.3900
C(53)-C(54)	1.3900	C(83)-C(88)	1.3900
C(53)-C(58)	1.3900	C(84)-C(85)	1.3900
C(54)-C(55)	1.3900	C(84)-H(84)	0.9500
C(54)-H(54)	0.9500	C(85)-C(86)	1.3900
C(55)-C(56)	1.3900	C(85)-H(85)	0.9500
C(55)-H(55)	0.9500	C(86)-C(87)	1.3900
C(56)-C(57)	1.3900	C(86)-H(86)	0.9500
C(56)-H(56)	0.9500	C(87)-C(88)	1.3900
C(57)-C(58)	1.3900	C(87)-H(87)	0.9500
C(57)-H(57)	0.9500	C(88)-H(88)	0.9500
C(58)-H(58)	0.9500	B(1)-C(108)	1.662(18)
C(59)-C(60)	1.3900	B(1)-C(90)	1.694(18)
C(59)-C(64)	1.3900	B(1)-C(102)	1.695(18)
C(60)-C(61)	1.3900	B(1)-C(96)	1.731(18)
C(60)-H(60)	0.9500	F(91)-C(91)	1.291(10)
C(61)-C(62)	1.3900	F(92)-C(92)	1.326(10)
C(61)-H(61)	0.9500	F(93)-C(93)	1.389(11)
C(62)-C(63)	1.3900	F(94)-C(94)	1.334(10)
C(62)-H(62)	0.9500	F(95)-C(95)	1.312(10)
C(63)-C(64)	1.3900	F(97)-C(97)	1.279(10)
C(63)-H(63)	0.9500	F(98)-C(98)	1.341(11)
C(64)-H(64)	0.9500	F(99)-C(99)	1.366(12)
C(65)-C(66)	1.3900	F(100)-C(100)	1.361(11)
C(65)-C(70)	1.3900	F(101)-C(101)	1.345(10)
C(66)-C(67)	1.3900	F(103)-C(103)	1.299(11)
C(66)-H(66)	0.9500	F(104)-C(104)	1.359(12)
C(67)-C(68)	1.3900	F(105)-C(105)	1.378(14)
C(67)-H(67)	0.9500	F(106)-C(106)	1.322(14)
C(68)-C(69)	1.3900	F(107)-C(107)	1.294(11)
C(68)-H(68)	0.9500	F(109)-C(109)	1.291(8)
C(69)-C(70)	1.3900	F(110)-C(110)	1.319(10)
C(69)-H(69)	0.9500	F(111)-C(111)	1.409(11)
C(70)-H(70)	0.9500	F(112)-C(112)	1.356(10)
C(71)-C(72)	1.3900	F(113)-C(113)	1.309(9)
C(71)-C(76)	1.3900	C(90)-C(91)	1.3900
C(72)-C(73)	1.3900	C(90)-C(95)	1.3900
C(72)-H(72)	0.9500	C(91)-C(92)	1.3900
C(73)-C(74)	1.3900	C(92)-C(93)	1.3900
C(73)-H(73)	0.9500	C(93)-C(94)	1.3900

C(94)-C(95)	1.3900	C(133)-C(134)	1.3900
C(96)-C(97)	1.3900	C(134)-C(135)	1.3900
C(96)-C(101)	1.3900	C(135)-C(136)	1.3900
C(97)-C(98)	1.3900	C(136)-C(137)	1.3900
C(98)-C(99)	1.3900	C(138)-C(139)	1.3900
C(99)-C(100)	1.3900	C(138)-C(143)	1.3900
C(100)-C(101)	1.3900	C(139)-C(140)	1.3900
C(102)-C(103)	1.3900	C(140)-C(141)	1.3900
C(102)-C(107)	1.3900	C(141)-C(142)	1.3900
C(103)-C(104)	1.3900	C(142)-C(143)	1.3900
C(104)-C(105)	1.3900	C(150)-C(151)	1.5204
C(105)-C(106)	1.3900	C(150)-H(15A)	0.9600
C(106)-C(107)	1.3900	C(150)-H(15B)	0.9600
C(108)-C(109)	1.3900	C(150)-H(15C)	0.9600
C(108)-C(113)	1.3900	C(151)-C(152)	1.3900
C(109)-C(110)	1.3900	C(151)-C(156)	1.3900
C(110)-C(111)	1.3900	C(152)-C(153)	1.3900
C(111)-C(112)	1.3900	C(152)-H(152)	0.9300
C(112)-C(113)	1.3900	C(153)-C(154)	1.3900
B(2)-C(138)	1.634(11)	C(153)-H(153)	0.9300
B(2)-C(126)	1.651(8)	C(154)-C(155)	1.3900
B(2)-C(120)	1.704(9)	C(154)-H(154)	0.9300
B(2)-C(132)	1.736(9)	C(155)-C(156)	1.3900
F(121)-C(121)	1.329(9)	C(155)-H(155)	0.9300
F(122)-C(122)	1.303(9)	C(156)-C(157)	1.5668
F(123)-C(123)	1.354(9)	C(157)-H(15D)	0.9600
F(124)-C(124)	1.319(9)	C(157)-H(15E)	0.9600
F(125)-C(125)	1.284(9)	C(157)-H(15F)	0.9600
F(127)-C(127)	1.245(8)	C(160)-C(161)	1.4088
F(128)-C(128)	1.334(8)	C(160)-H(16A)	0.9600
F(129)-C(129)	1.370(8)	C(160)-H(16B)	0.9600
F(130)-C(130)	1.344(8)	C(160)-H(16C)	0.9600
F(131)-C(131)	1.338(8)	C(161)-C(162)	1.3900
F(133)-C(133)	1.360(10)	C(161)-C(166)	1.3900
F(134)-C(134)	1.405(10)	C(162)-C(163)	1.3900
F(135)-C(135)	1.333(9)	C(162)-H(162)	0.9300
F(136)-C(136)	1.289(10)	C(163)-C(164)	1.3900
F(137)-C(137)	1.230(10)	C(163)-H(163)	0.9300
F(139)-C(139)	1.253(11)	C(164)-C(165)	1.3900
F(140)-C(140)	1.300(11)	C(164)-H(164)	0.9300
F(141)-C(141)	1.387(11)	C(165)-C(166)	1.3900
F(142)-C(142)	1.449(11)	C(165)-H(165)	0.9300
F(143)-C(143)	1.386(11)	C(166)-C(167)	1.4745
C(120)-C(121)	1.3900	C(167)-H(16D)	0.9600
C(120)-C(125)	1.3900	C(167)-H(16E)	0.9600
C(121)-C(122)	1.3900	C(167)-H(16F)	0.9600
C(122)-C(123)	1.3900	C(170)-C(171)	1.4595
C(123)-C(124)	1.3900	C(170)-H(17A)	0.9600
C(124)-C(125)	1.3900	C(170)-H(17B)	0.9600
C(126)-C(127)	1.3900	C(170)-H(17C)	0.9600
C(126)-C(131)	1.3900	C(171)-C(172)	1.3900
C(127)-C(128)	1.3900	C(171)-C(176)	1.3900
C(128)-C(129)	1.3900	C(172)-C(173)	1.3900
C(129)-C(130)	1.3900	C(172)-H(172)	0.9300
C(130)-C(131)	1.3900	C(173)-C(174)	1.3900
C(132)-C(133)	1.3900	C(173)-H(173)	0.9300
C(132)-C(137)	1.3900	C(174)-C(175)	1.3900

C(174)-H(174)	0.9300
C(175)-C(176)	1.3900
C(175)-H(175)	0.9300
C(176)-C(177)	1.30(2)
C(177)-H(17D)	1.1778
C(177)-H(17E)	0.9434
C(177)-H(17F)	0.9525
C(180)-C(181)	1.4586
C(180)-H(18A)	0.9600
C(180)-H(18B)	0.9600
C(180)-H(18C)	0.9600
C(181)-C(182)	1.3900
C(181)-C(186)	1.3900
C(182)-C(183)	1.3900
C(182)-H(182)	0.9300
C(183)-C(184)	1.3900
C(183)-H(183)	0.9300
C(184)-C(185)	1.3900
C(184)-H(184)	0.9300
C(185)-C(186)	1.3900
C(185)-H(185)	0.9300
C(186)-C(187)	1.4713
C(187)-H(18D)	0.9600
C(187)-H(18E)	0.9600
C(187)-H(18F)	0.9600

C(79)-Pt(1)-P(3)	124.0(3)
C(79)-Pt(1)-P(4)	133.2(3)
P(3)-Pt(1)-P(4)	97.78(11)
C(79)-Pt(1)-C(80)	37.2(4)
P(3)-Pt(1)-C(80)	98.7(3)
P(4)-Pt(1)-C(80)	162.0(3)
C(79)-Pt(1)-C(78)	38.5(4)
P(3)-Pt(1)-C(78)	162.4(3)
P(4)-Pt(1)-C(78)	99.1(3)
C(80)-Pt(1)-C(78)	65.4(4)
C(82)-Pt(2)-C(81)	37.8(4)
C(82)-Pt(2)-P(2)	130.5(3)
C(81)-Pt(2)-P(2)	98.9(3)
C(82)-Pt(2)-P(1)	128.0(3)
C(81)-Pt(2)-P(1)	164.4(3)
P(2)-Pt(2)-P(1)	96.72(12)
C(82)-Pt(2)-C(77)	38.6(4)
C(81)-Pt(2)-C(77)	64.7(4)
P(2)-Pt(2)-C(77)	162.2(3)
P(1)-Pt(2)-C(77)	99.9(3)
C(1)-P(1)-C(5)	105.1(5)
C(1)-P(1)-C(11)	105.2(5)
C(5)-P(1)-C(11)	106.9(4)
C(1)-P(1)-Pt(2)	113.9(4)
C(5)-P(1)-Pt(2)	114.7(3)
C(11)-P(1)-Pt(2)	110.3(3)
C(2)-P(2)-C(35)	107.1(5)
C(2)-P(2)-C(29)	108.3(6)
C(35)-P(2)-C(29)	107.0(5)
C(2)-P(2)-Pt(2)	111.3(4)
C(35)-P(2)-Pt(2)	111.5(3)
C(29)-P(2)-Pt(2)	111.4(4)
C(47)-P(3)-C(3)	105.5(5)
C(47)-P(3)-C(41)	108.1(4)
C(3)-P(3)-C(41)	105.3(5)
C(47)-P(3)-Pt(1)	118.7(3)
C(3)-P(3)-Pt(1)	112.1(4)
C(41)-P(3)-Pt(1)	106.4(3)
C(71)-P(4)-C(65)	107.6(4)
C(71)-P(4)-C(4)	107.0(5)
C(65)-P(4)-C(4)	105.0(5)
C(71)-P(4)-Pt(1)	113.3(3)
C(65)-P(4)-Pt(1)	108.0(3)
C(4)-P(4)-Pt(1)	115.4(4)
C(59)-Si(1)-C(3)	110.4(5)
C(59)-Si(1)-C(53)	110.2(4)
C(3)-Si(1)-C(53)	110.1(5)
C(59)-Si(1)-C(4)	109.5(5)
C(3)-Si(1)-C(4)	109.8(5)
C(53)-Si(1)-C(4)	106.8(5)
C(2)-Si(2)-C(1)	108.0(5)
C(2)-Si(2)-C(17)	110.6(5)
C(1)-Si(2)-C(17)	110.2(5)
C(2)-Si(2)-C(23)	112.5(5)
C(1)-Si(2)-C(23)	107.6(5)
C(17)-Si(2)-C(23)	108.0(4)
P(1)-C(1)-Si(2)	115.6(6)
P(1)-C(1)-H(1A)	108.4
Si(2)-C(1)-H(1A)	108.4
P(1)-C(1)-H(1B)	108.4
Si(2)-C(1)-H(1B)	108.4
H(1A)-C(1)-H(1B)	107.4
P(2)-C(2)-Si(2)	117.6(7)
P(2)-C(2)-H(2A)	107.9
Si(2)-C(2)-H(2A)	107.9
P(2)-C(2)-H(2B)	107.9
Si(2)-C(2)-H(2B)	107.9
H(2A)-C(2)-H(2B)	107.2
P(3)-C(3)-Si(1)	116.9(6)
P(3)-C(3)-H(3A)	108.1
Si(1)-C(3)-H(3A)	108.1
P(3)-C(3)-H(3B)	108.1
Si(1)-C(3)-H(3B)	108.1
H(3A)-C(3)-H(3B)	107.3
P(4)-C(4)-Si(1)	114.3(6)
P(4)-C(4)-H(4A)	108.7
Si(1)-C(4)-H(4A)	108.7
P(4)-C(4)-H(4B)	108.7
Si(1)-C(4)-H(4B)	108.7
H(4A)-C(4)-H(4B)	107.6
C(6)-C(5)-C(10)	120.0
C(6)-C(5)-P(1)	118.6(5)
C(10)-C(5)-P(1)	121.3(5)
C(5)-C(6)-C(7)	120.0
C(5)-C(6)-H(6)	120.0
C(7)-C(6)-H(6)	120.0
C(6)-C(7)-C(8)	120.0
C(6)-C(7)-H(7)	120.0

C(8)-C(7)-H(7)	120.0	C(27)-C(26)-H(26)	120.0
C(9)-C(8)-C(7)	120.0	C(28)-C(27)-C(26)	120.0
C(9)-C(8)-H(8)	120.0	C(28)-C(27)-H(27)	120.0
C(7)-C(8)-H(8)	120.0	C(26)-C(27)-H(27)	120.0
C(8)-C(9)-C(10)	120.0	C(27)-C(28)-C(23)	120.0
C(8)-C(9)-H(9)	120.0	C(27)-C(28)-H(28)	120.0
C(10)-C(9)-H(9)	120.0	C(23)-C(28)-H(28)	120.0
C(9)-C(10)-C(5)	120.0	C(30)-C(29)-C(34)	120.0
C(9)-C(10)-H(10)	120.0	C(30)-C(29)-P(2)	119.4(6)
C(5)-C(10)-H(10)	120.0	C(34)-C(29)-P(2)	119.6(6)
C(12)-C(11)-C(16)	120.0	C(31)-C(30)-C(29)	120.0
C(12)-C(11)-P(1)	119.4(5)	C(31)-C(30)-H(30)	120.0
C(16)-C(11)-P(1)	120.4(5)	C(29)-C(30)-H(30)	120.0
C(13)-C(12)-C(11)	120.0	C(30)-C(31)-C(32)	120.0
C(13)-C(12)-H(12)	120.0	C(30)-C(31)-H(31)	120.0
C(11)-C(12)-H(12)	120.0	C(32)-C(31)-H(31)	120.0
C(14)-C(13)-C(12)	120.0	C(33)-C(32)-C(31)	120.0
C(14)-C(13)-H(13)	120.0	C(33)-C(32)-H(32)	120.0
C(12)-C(13)-H(13)	120.0	C(31)-C(32)-H(32)	120.0
C(13)-C(14)-C(15)	120.0	C(34)-C(33)-C(32)	120.0
C(13)-C(14)-H(14)	120.0	C(34)-C(33)-H(33)	120.0
C(15)-C(14)-H(14)	120.0	C(32)-C(33)-H(33)	120.0
C(14)-C(15)-C(16)	120.0	C(33)-C(34)-C(29)	120.0
C(14)-C(15)-H(15)	120.0	C(33)-C(34)-H(34)	120.0
C(16)-C(15)-H(15)	120.0	C(29)-C(34)-H(34)	120.0
C(15)-C(16)-C(11)	120.0	C(36)-C(35)-C(40)	120.0
C(15)-C(16)-H(16)	120.0	C(36)-C(35)-P(2)	118.5(5)
C(11)-C(16)-H(16)	120.0	C(40)-C(35)-P(2)	121.5(5)
C(18)-C(17)-C(22)	120.0	C(37)-C(36)-C(35)	120.0
C(18)-C(17)-Si(2)	116.3(5)	C(37)-C(36)-H(36)	120.0
C(22)-C(17)-Si(2)	123.6(5)	C(35)-C(36)-H(36)	120.0
C(17)-C(18)-C(19)	120.0	C(36)-C(37)-C(38)	120.0
C(17)-C(18)-H(18)	120.0	C(36)-C(37)-H(37)	120.0
C(19)-C(18)-H(18)	120.0	C(38)-C(37)-H(37)	120.0
C(20)-C(19)-C(18)	120.0	C(39)-C(38)-C(37)	120.0
C(20)-C(19)-H(19)	120.0	C(39)-C(38)-H(38)	120.0
C(18)-C(19)-H(19)	120.0	C(37)-C(38)-H(38)	120.0
C(19)-C(20)-C(21)	120.0	C(38)-C(39)-C(40)	120.0
C(19)-C(20)-H(20)	120.0	C(38)-C(39)-H(39)	120.0
C(21)-C(20)-H(20)	120.0	C(40)-C(39)-H(39)	120.0
C(22)-C(21)-C(20)	120.0	C(39)-C(40)-C(35)	120.0
C(22)-C(21)-H(21)	120.0	C(39)-C(40)-H(40)	120.0
C(20)-C(21)-H(21)	120.0	C(35)-C(40)-H(40)	120.0
C(21)-C(22)-C(17)	120.0	C(42)-C(41)-C(46)	120.0
C(21)-C(22)-H(22)	120.0	C(42)-C(41)-P(3)	117.3(5)
C(17)-C(22)-H(22)	120.0	C(46)-C(41)-P(3)	122.6(5)
C(24)-C(23)-C(28)	120.0	C(43)-C(42)-C(41)	120.0
C(24)-C(23)-Si(2)	116.6(5)	C(43)-C(42)-H(42)	120.0
C(28)-C(23)-Si(2)	123.2(5)	C(41)-C(42)-H(42)	120.0
C(23)-C(24)-C(25)	120.0	C(42)-C(43)-C(44)	120.0
C(23)-C(24)-H(24)	120.0	C(42)-C(43)-H(43)	120.0
C(25)-C(24)-H(24)	120.0	C(44)-C(43)-H(43)	120.0
C(26)-C(25)-C(24)	120.0	C(45)-C(44)-C(43)	120.0
C(26)-C(25)-H(25)	120.0	C(45)-C(44)-H(44)	120.0
C(24)-C(25)-H(25)	120.0	C(43)-C(44)-H(44)	120.0
C(25)-C(26)-C(27)	120.0	C(44)-C(45)-C(46)	120.0
C(25)-C(26)-H(26)	120.0	C(44)-C(45)-H(45)	120.0

C(46)-C(45)-H(45)	120.0	C(59)-C(64)-H(64)	120.0
C(45)-C(46)-C(41)	120.0	C(66)-C(65)-C(70)	120.0
C(45)-C(46)-H(46)	120.0	C(66)-C(65)-P(4)	119.9(5)
C(41)-C(46)-H(46)	120.0	C(70)-C(65)-P(4)	119.8(5)
C(48)-C(47)-C(52)	120.0	C(65)-C(66)-C(67)	120.0
C(48)-C(47)-P(3)	118.9(5)	C(65)-C(66)-H(66)	120.0
C(52)-C(47)-P(3)	120.9(5)	C(67)-C(66)-H(66)	120.0
C(49)-C(48)-C(47)	120.0	C(68)-C(67)-C(66)	120.0
C(49)-C(48)-H(48)	120.0	C(68)-C(67)-H(67)	120.0
C(47)-C(48)-H(48)	120.0	C(66)-C(67)-H(67)	120.0
C(48)-C(49)-C(50)	120.0	C(67)-C(68)-C(69)	120.0
C(48)-C(49)-H(49)	120.0	C(67)-C(68)-H(68)	120.0
C(50)-C(49)-H(49)	120.0	C(69)-C(68)-H(68)	120.0
C(49)-C(50)-C(51)	120.0	C(70)-C(69)-C(68)	120.0
C(49)-C(50)-H(50)	120.0	C(70)-C(69)-H(69)	120.0
C(51)-C(50)-H(50)	120.0	C(68)-C(69)-H(69)	120.0
C(52)-C(51)-C(50)	120.0	C(69)-C(70)-C(65)	120.0
C(52)-C(51)-H(51)	120.0	C(69)-C(70)-H(70)	120.0
C(50)-C(51)-H(51)	120.0	C(65)-C(70)-H(70)	120.0
C(51)-C(52)-C(47)	120.0	C(72)-C(71)-C(76)	120.0
C(51)-C(52)-H(52)	120.0	C(72)-C(71)-P(4)	119.1(5)
C(47)-C(52)-H(52)	120.0	C(76)-C(71)-P(4)	120.9(5)
C(54)-C(53)-C(58)	120.0	C(71)-C(72)-C(73)	120.0
C(54)-C(53)-Si(1)	123.7(4)	C(71)-C(72)-H(72)	120.0
C(58)-C(53)-Si(1)	116.3(4)	C(73)-C(72)-H(72)	120.0
C(53)-C(54)-C(55)	120.0	C(74)-C(73)-C(72)	120.0
C(53)-C(54)-H(54)	120.0	C(74)-C(73)-H(73)	120.0
C(55)-C(54)-H(54)	120.0	C(72)-C(73)-H(73)	120.0
C(56)-C(55)-C(54)	120.0	C(75)-C(74)-C(73)	120.0
C(56)-C(55)-H(55)	120.0	C(75)-C(74)-H(74)	120.0
C(54)-C(55)-H(55)	120.0	C(73)-C(74)-H(74)	120.0
C(57)-C(56)-C(55)	120.0	C(74)-C(75)-C(76)	120.0
C(57)-C(56)-H(56)	120.0	C(74)-C(75)-H(75)	120.0
C(55)-C(56)-H(56)	120.0	C(76)-C(75)-H(75)	120.0
C(58)-C(57)-C(56)	120.0	C(75)-C(76)-C(71)	120.0
C(58)-C(57)-H(57)	120.0	C(75)-C(76)-H(76)	120.0
C(56)-C(57)-H(57)	120.0	C(71)-C(76)-H(76)	120.0
C(57)-C(58)-C(53)	120.0	C(78)-C(77)-C(82)	119.7(11)
C(57)-C(58)-H(58)	120.0	C(78)-C(77)-Pt(2)	102.1(8)
C(53)-C(58)-H(58)	120.0	C(82)-C(77)-Pt(2)	67.2(7)
C(60)-C(59)-C(64)	120.0	C(78)-C(77)-H(77)	118.3
C(60)-C(59)-Si(1)	121.8(5)	C(82)-C(77)-H(77)	118.3
C(64)-C(59)-Si(1)	118.1(5)	Pt(2)-C(77)-H(77)	118.3
C(59)-C(60)-C(61)	120.0	C(77)-C(78)-C(79)	119.2(12)
C(59)-C(60)-H(60)	120.0	C(77)-C(78)-Pt(1)	103.1(9)
C(61)-C(60)-H(60)	120.0	C(79)-C(78)-Pt(1)	64.8(7)
C(62)-C(61)-C(60)	120.0	C(77)-C(78)-H(78)	118.6
C(62)-C(61)-H(61)	120.0	C(79)-C(78)-H(78)	118.6
C(60)-C(61)-H(61)	120.0	Pt(1)-C(78)-H(78)	118.6
C(63)-C(62)-C(61)	120.0	C(80)-C(79)-C(78)	118.1(12)
C(63)-C(62)-H(62)	120.0	C(80)-C(79)-Pt(1)	77.0(7)
C(61)-C(62)-H(62)	120.0	C(78)-C(79)-Pt(1)	76.7(7)
C(62)-C(63)-C(64)	120.0	C(80)-C(79)-H(79)	120.9
C(62)-C(63)-H(63)	120.0	C(78)-C(79)-H(79)	120.9
C(64)-C(63)-H(63)	120.0	Pt(1)-C(79)-H(79)	120.9
C(63)-C(64)-C(59)	120.0	C(79)-C(80)-C(81)	116.6(11)
C(63)-C(64)-H(64)	120.0	C(79)-C(80)-Pt(1)	65.8(7)

C(81)-C(80)-Pt(1)	102.6(8)	C(94)-C(95)-C(90)	120.0
C(79)-C(80)-H(80)	119.4	C(97)-C(96)-C(101)	120.0
C(81)-C(80)-H(80)	119.4	C(97)-C(96)-B(1)	117.4(8)
Pt(1)-C(80)-H(80)	119.4	C(101)-C(96)-B(1)	122.4(8)
C(80)-C(81)-C(82)	122.5(12)	F(97)-C(97)-C(98)	118.6(8)
C(80)-C(81)-Pt(2)	105.0(8)	F(97)-C(97)-C(96)	121.4(8)
C(82)-C(81)-Pt(2)	69.4(7)	C(98)-C(97)-C(96)	120.0
C(80)-C(81)-H(81)	116.4	F(98)-C(98)-C(97)	119.2(9)
C(82)-C(81)-H(81)	116.4	F(98)-C(98)-C(99)	120.8(9)
Pt(2)-C(81)-H(81)	116.4	C(97)-C(98)-C(99)	120.0
C(81)-C(82)-C(83)	126.2(11)	F(99)-C(99)-C(100)	120.0(9)
C(81)-C(82)-C(77)	112.0(11)	F(99)-C(99)-C(98)	119.7(9)
C(83)-C(82)-C(77)	121.3(10)	C(100)-C(99)-C(98)	120.0
C(81)-C(82)-Pt(2)	72.8(7)	F(100)-C(100)-C(101)	120.2(8)
C(83)-C(82)-Pt(2)	114.3(8)	F(100)-C(100)-C(99)	119.8(8)
C(77)-C(82)-Pt(2)	74.2(7)	C(101)-C(100)-C(99)	120.0
C(84)-C(83)-C(88)	120.0	F(101)-C(101)-C(100)	114.7(8)
C(84)-C(83)-C(82)	117.6(8)	F(101)-C(101)-C(96)	125.3(8)
C(88)-C(83)-C(82)	122.3(8)	C(100)-C(101)-C(96)	120.0
C(83)-C(84)-C(85)	120.0	C(103)-C(102)-C(107)	120.0
C(83)-C(84)-H(84)	120.0	C(103)-C(102)-B(1)	117.0(9)
C(85)-C(84)-H(84)	120.0	C(107)-C(102)-B(1)	123.0(9)
C(84)-C(85)-C(86)	120.0	F(103)-C(103)-C(104)	117.8(9)
C(84)-C(85)-H(85)	120.0	F(103)-C(103)-C(102)	122.2(9)
C(86)-C(85)-H(85)	120.0	C(104)-C(103)-C(102)	120.0
C(85)-C(86)-C(87)	120.0	F(104)-C(104)-C(103)	119.4(9)
C(85)-C(86)-H(86)	120.0	F(104)-C(104)-C(105)	120.5(9)
C(87)-C(86)-H(86)	120.0	C(103)-C(104)-C(105)	120.0
C(88)-C(87)-C(86)	120.0	F(105)-C(105)-C(106)	120.6(10)
C(88)-C(87)-H(87)	120.0	F(105)-C(105)-C(104)	119.4(10)
C(86)-C(87)-H(87)	120.0	C(106)-C(105)-C(104)	120.0
C(87)-C(88)-C(83)	120.0	F(106)-C(106)-C(105)	118.1(10)
C(87)-C(88)-H(88)	120.0	F(106)-C(106)-C(107)	121.8(10)
C(83)-C(88)-H(88)	120.0	C(105)-C(106)-C(107)	120.0
C(108)-B(1)-C(90)	113.9(10)	F(107)-C(107)-C(106)	115.0(9)
C(108)-B(1)-C(102)	114.4(11)	F(107)-C(107)-C(102)	125.0(9)
C(90)-B(1)-C(102)	101.1(10)	C(106)-C(107)-C(102)	120.0
C(108)-B(1)-C(96)	100.8(10)	C(109)-C(108)-C(113)	120.0
C(90)-B(1)-C(96)	111.9(11)	C(109)-C(108)-B(1)	123.3(6)
C(102)-B(1)-C(96)	115.2(11)	C(113)-C(108)-B(1)	116.7(6)
C(91)-C(90)-C(95)	120.0	F(109)-C(109)-C(110)	115.4(4)
C(91)-C(90)-B(1)	114.1(8)	F(109)-C(109)-C(108)	124.6(4)
C(95)-C(90)-B(1)	125.2(8)	C(110)-C(109)-C(108)	120.0
F(91)-C(91)-C(92)	118.0(8)	F(110)-C(110)-C(109)	121.6(4)
F(91)-C(91)-C(90)	122.0(8)	F(110)-C(110)-C(111)	118.4(4)
C(92)-C(91)-C(90)	120.0	C(109)-C(110)-C(111)	120.0
F(92)-C(92)-C(93)	120.9(8)	C(112)-C(111)-C(110)	120.0
F(92)-C(92)-C(91)	119.1(8)	C(112)-C(111)-F(111)	117.8(5)
C(93)-C(92)-C(91)	120.0	C(110)-C(111)-F(111)	122.2(5)
F(93)-C(93)-C(92)	120.1(8)	F(112)-C(112)-C(111)	119.6(5)
F(93)-C(93)-C(94)	119.9(8)	F(112)-C(112)-C(113)	120.3(5)
C(92)-C(93)-C(94)	120.0	C(111)-C(112)-C(113)	120.0
F(94)-C(94)-C(93)	119.2(8)	F(113)-C(113)-C(112)	115.7(4)
F(94)-C(94)-C(95)	120.8(8)	F(113)-C(113)-C(108)	124.2(4)
C(93)-C(94)-C(95)	120.0	C(112)-C(113)-C(108)	120.0
F(95)-C(95)-C(94)	116.3(8)	C(138)-B(2)-C(126)	115.4(7)
F(95)-C(95)-C(90)	123.6(8)	C(138)-B(2)-C(120)	103.2(6)

C(126)-B(2)-C(120)	115.2(6)	C(136)-C(137)-C(132)	120.0
C(138)-B(2)-C(132)	115.1(7)	C(139)-C(138)-C(143)	120.0
C(126)-B(2)-C(132)	94.1(6)	C(139)-C(138)-B(2)	118.5(11)
C(120)-B(2)-C(132)	114.4(6)	C(143)-C(138)-B(2)	121.1(11)
C(121)-C(120)-C(125)	120.0	F(139)-C(139)-C(140)	120.0(12)
C(121)-C(120)-B(2)	122.3(8)	F(139)-C(139)-C(138)	119.7(12)
C(125)-C(120)-B(2)	117.5(8)	C(140)-C(139)-C(138)	120.0
F(121)-C(121)-C(122)	114.9(10)	F(140)-C(140)-C(139)	123.4(14)
F(121)-C(121)-C(120)	124.9(9)	F(140)-C(140)-C(141)	116.6(14)
C(122)-C(121)-C(120)	120.0	C(139)-C(140)-C(141)	120.0
F(122)-C(122)-C(121)	121.5(10)	F(141)-C(141)-C(140)	119.8(15)
F(122)-C(122)-C(123)	118.5(10)	F(141)-C(141)-C(142)	120.0(15)
C(121)-C(122)-C(123)	120.0	C(140)-C(141)-C(142)	120.0
F(123)-C(123)-C(124)	121.2(10)	C(143)-C(142)-C(141)	120.0
F(123)-C(123)-C(122)	118.8(10)	C(143)-C(142)-F(142)	121.8(15)
C(124)-C(123)-C(122)	120.0	C(141)-C(142)-F(142)	117.9(15)
F(124)-C(124)-C(125)	121.6(10)	F(143)-C(143)-C(142)	112.3(14)
F(124)-C(124)-C(123)	118.1(10)	F(143)-C(143)-C(138)	127.6(14)
C(125)-C(124)-C(123)	120.0	C(142)-C(143)-C(138)	120.0
F(125)-C(125)-C(124)	118.9(10)	C(151)-C(150)-H(15A)	109.5
F(125)-C(125)-C(120)	120.8(10)	C(151)-C(150)-H(15B)	109.5
C(124)-C(125)-C(120)	120.0	H(15A)-C(150)-H(15B)	109.5
C(127)-C(126)-C(131)	120.0	C(151)-C(150)-H(15C)	109.5
C(127)-C(126)-B(2)	119.6(8)	H(15A)-C(150)-H(15C)	109.5
C(131)-C(126)-B(2)	120.4(8)	H(15B)-C(150)-H(15C)	109.5
F(127)-C(127)-C(126)	122.7(9)	C(152)-C(151)-C(156)	120.0
F(127)-C(127)-C(128)	116.9(9)	C(152)-C(151)-C(150)	123.3
C(126)-C(127)-C(128)	120.0	C(156)-C(151)-C(150)	116.6
F(128)-C(128)-C(129)	117.9(9)	C(151)-C(152)-C(153)	120.0
F(128)-C(128)-C(127)	121.6(9)	C(151)-C(152)-H(152)	120.0
C(129)-C(128)-C(127)	120.0	C(153)-C(152)-H(152)	120.0
F(129)-C(129)-C(128)	123.6(9)	C(154)-C(153)-C(152)	120.0
F(129)-C(129)-C(130)	116.4(9)	C(154)-C(153)-H(153)	120.0
C(128)-C(129)-C(130)	120.0	C(152)-C(153)-H(153)	120.0
F(130)-C(130)-C(131)	122.2(9)	C(153)-C(154)-C(155)	120.0
F(130)-C(130)-C(129)	117.8(9)	C(153)-C(154)-H(154)	120.0
C(131)-C(130)-C(129)	120.0	C(155)-C(154)-H(154)	120.0
F(131)-C(131)-C(130)	114.6(9)	C(156)-C(155)-C(154)	120.0
F(131)-C(131)-C(126)	125.4(9)	C(156)-C(155)-H(155)	120.0
C(130)-C(131)-C(126)	120.0	C(154)-C(155)-H(155)	120.0
C(133)-C(132)-C(137)	120.0	C(155)-C(156)-C(151)	120.0
C(133)-C(132)-B(2)	122.8(9)	C(155)-C(156)-C(157)	121.4
C(137)-C(132)-B(2)	117.2(9)	C(151)-C(156)-C(157)	118.6
F(133)-C(133)-C(134)	113.3(10)	C(156)-C(157)-H(15D)	109.5
F(133)-C(133)-C(132)	123.8(10)	C(156)-C(157)-H(15E)	109.5
C(134)-C(133)-C(132)	120.0	H(15D)-C(157)-H(15E)	109.5
C(133)-C(134)-C(135)	120.0	C(156)-C(157)-H(15F)	109.5
C(133)-C(134)-F(134)	122.6(10)	H(15D)-C(157)-H(15F)	109.5
C(135)-C(134)-F(134)	116.2(10)	H(15E)-C(157)-H(15F)	109.5
F(135)-C(135)-C(134)	121.9(11)	C(161)-C(160)-H(16A)	109.5
F(135)-C(135)-C(136)	118.1(11)	C(161)-C(160)-H(16B)	109.5
C(134)-C(135)-C(136)	120.0	H(16A)-C(160)-H(16B)	109.5
F(136)-C(136)-C(137)	123.4(11)	C(161)-C(160)-H(16C)	109.5
F(136)-C(136)-C(135)	114.7(11)	H(16A)-C(160)-H(16C)	109.5
C(137)-C(136)-C(135)	120.0	H(16B)-C(160)-H(16C)	109.5
F(137)-C(137)-C(136)	117.5(11)	C(162)-C(161)-C(166)	120.0
F(137)-C(137)-C(132)	120.4(11)	C(162)-C(161)-C(160)	115.2

C(166)-C(161)-C(160)	124.3	C(174)-C(175)-H(175)	120.0
C(161)-C(162)-C(163)	120.0	C(176)-C(175)-H(175)	120.0
C(161)-C(162)-H(162)	120.0	C(177)-C(176)-C(175)	110.2(12)
C(163)-C(162)-H(162)	120.0	C(177)-C(176)-C(171)	129.8(12)
C(162)-C(163)-C(164)	120.0	C(175)-C(176)-C(171)	120.0
C(162)-C(163)-H(163)	120.0	C(176)-C(177)-H(17D)	104.9
C(164)-C(163)-H(163)	120.0	C(176)-C(177)-H(17E)	121.6
C(163)-C(164)-C(165)	120.0	H(17D)-C(177)-H(17E)	94.7
C(163)-C(164)-H(164)	120.0	C(176)-C(177)-H(17F)	120.8
C(165)-C(164)-H(164)	120.0	H(17D)-C(177)-H(17F)	94.2
C(166)-C(165)-C(164)	120.0	H(17E)-C(177)-H(17F)	111.6
C(166)-C(165)-H(165)	120.0	C(181)-C(180)-H(18A)	109.5
C(164)-C(165)-H(165)	120.0	C(181)-C(180)-H(18B)	109.5
C(165)-C(166)-C(161)	120.0	H(18A)-C(180)-H(18B)	109.5
C(165)-C(166)-C(167)	124.8	C(181)-C(180)-H(18C)	109.5
C(161)-C(166)-C(167)	115.2	H(18A)-C(180)-H(18C)	109.5
C(166)-C(167)-H(16D)	109.5	H(18B)-C(180)-H(18C)	109.5
C(166)-C(167)-H(16E)	109.5	C(182)-C(181)-C(186)	120.0
H(16D)-C(167)-H(16E)	109.5	C(182)-C(181)-C(180)	124.1
C(166)-C(167)-H(16F)	109.5	C(186)-C(181)-C(180)	115.9
H(16D)-C(167)-H(16F)	109.5	C(183)-C(182)-C(181)	120.0
H(16E)-C(167)-H(16F)	109.5	C(183)-C(182)-H(182)	120.0
C(171)-C(170)-H(17A)	109.5	C(181)-C(182)-H(182)	120.0
C(171)-C(170)-H(17B)	109.5	C(182)-C(183)-C(184)	120.0
H(17A)-C(170)-H(17B)	109.5	C(182)-C(183)-H(183)	120.0
C(171)-C(170)-H(17C)	109.5	C(184)-C(183)-H(183)	120.0
H(17A)-C(170)-H(17C)	109.5	C(185)-C(184)-C(183)	120.0
H(17B)-C(170)-H(17C)	109.5	C(185)-C(184)-H(184)	120.0
C(172)-C(171)-C(176)	120.0	C(183)-C(184)-H(184)	120.0
C(172)-C(171)-C(170)	135.5	C(184)-C(185)-C(186)	120.0
C(176)-C(171)-C(170)	104.5	C(184)-C(185)-H(185)	120.0
C(171)-C(172)-C(173)	120.0	C(186)-C(185)-H(185)	120.0
C(171)-C(172)-H(172)	120.0	C(185)-C(186)-C(181)	120.0
C(173)-C(172)-H(172)	120.0	C(185)-C(186)-C(187)	122.2
C(172)-C(173)-C(174)	120.0	C(181)-C(186)-C(187)	117.7
C(172)-C(173)-H(173)	120.0	C(186)-C(187)-H(18D)	109.5
C(174)-C(173)-H(173)	120.0	C(186)-C(187)-H(18E)	109.5
C(175)-C(174)-C(173)	120.0	H(18D)-C(187)-H(18E)	109.5
C(175)-C(174)-H(174)	120.0	C(186)-C(187)-H(18F)	109.5
C(173)-C(174)-H(174)	120.0	H(18D)-C(187)-H(18F)	109.5
C(174)-C(175)-C(176)	120.0	H(18E)-C(187)-H(18F)	109.5

Figure 12. Fully labeled drawing of $[Ph_2BP_2]Pt(Me)\{P(C_6F_5)_3\}\cdot$benzene (**25·benzene**) (hydrogen atoms omitted).

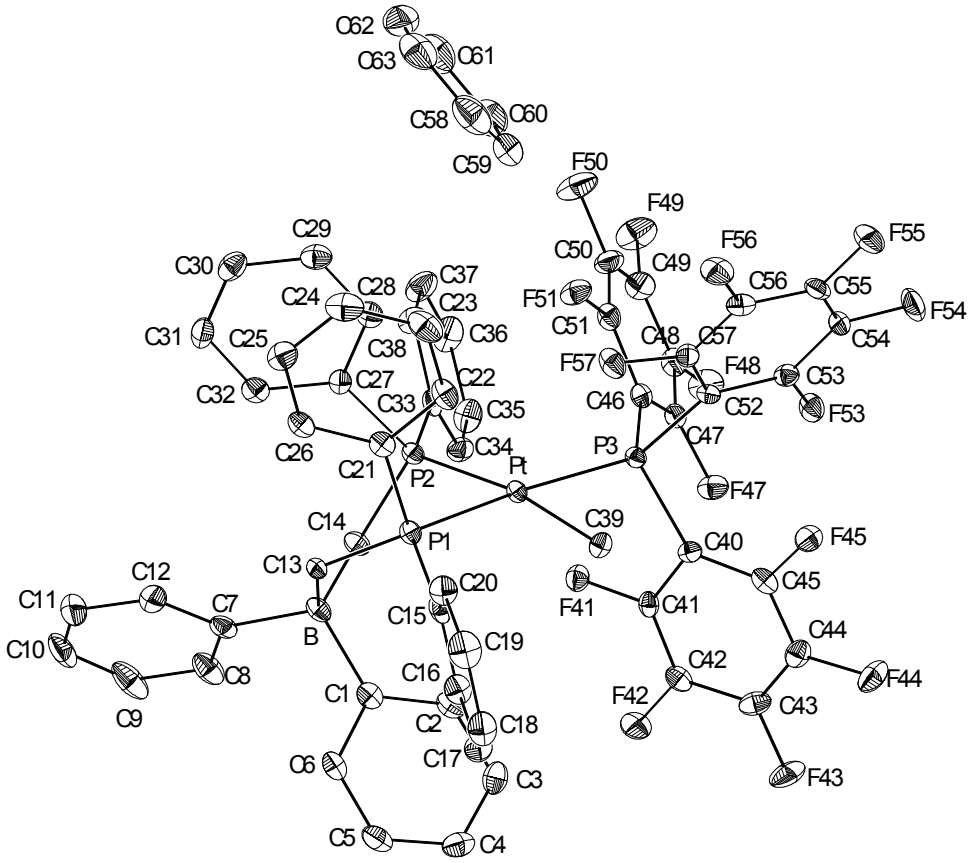


Table 11. Crystal data and structure refinement for $[Ph_2BP_2]Pt(Me)\{P(C_6F_5)_3\}\cdot$benzene (25·benzene).

Empirical formula	$C_{57}H_{37}BF_{15}P_3Pt \cdot C_6H_6$	
Formula weight	1305.67 · 78.11	
Crystallization Solvent	petroleum ether / benzene	
Crystal Habit	Triangular prism	
Crystal Color	Colorless	
Crystal size	0.29 x 0.21 x 0.15 mm^3	
Data Collection		
Data collection temperature	98(2) K	
Unit cell dimensions	a = 11.096(2) Å	α= 96.85(3)°
	b = 12.329(3) Å	β= 103.38(3)°
	c = 20.719(4) Å	γ = 92.92(3)°
Volume	2728.7(9) $Å^3$	
Z	2	
Crystal system	Triclinic	
Space group	$P\bar{1}$ (#2)	
Density (calculated)	1.684 Mg/m^3	
F(000)	1368	
Theta range for data collection	1.67 to 26.45°	
Completeness to θ = 26.45°	99.5%	
Index ranges	-13<=h<=13, -15<=k<=15, -25<=l<=25	
Reflections collected	54498	
Independent reflections	11214 [R(int) = 0.0612]	
Absorption coefficient	2.753 mm^{-1}	
Absorption correction	Empirical	
Structure solution and Refinement		
Primary solution method	Direct methods	
Secondary solution method	Difference Fourier map	
Hydrogen placement	Calculated	
Max. and min. transmission	0.662 and 0.505	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	11214 / 0 / 749	
Goodness-of-fit on F^2	1.210	
Final R indices [I>2σ(I), 9646 reflections]	R1 = 0.0297, wR2 = 0.0621	
R indices (all data)	R1 = 0.0399, wR2 = 0.0654	
Largest diff. peak and hole	1.628 and -0.965 $e.Å^{-3}$	

Table 12. Bond lengths [Å] and angles [°] for $[Ph_2BP_2]Pt(Me)\{P(C_6F_5)_3\}$·benzene (25·benzene).

Pt-C(39)	2.120(3)	C(22)-C(23)	1.378(5)
Pt-P(3)	2.2662(12)	C(22)-H(22)	0.9300
Pt-P(2)	2.3361(10)	C(23)-C(24)	1.374(5)
Pt-P(1)	2.3412(12)	C(23)-H(23)	0.9300
Pt-B	3.845(4)	C(24)-C(25)	1.376(5)
P(1)-C(13)	1.804(3)	C(24)-H(24)	0.9300
P(1)-C(21)	1.828(3)	C(25)-C(26)	1.387(5)
P(1)-C(15)	1.840(3)	C(25)-H(25)	0.9300
P(2)-C(14)	1.801(3)	C(26)-H(26)	0.9300
P(2)-C(27)	1.821(3)	C(27)-C(32)	1.391(5)
P(2)-C(33)	1.847(3)	C(27)-C(28)	1.394(5)
P(3)-C(40)	1.832(3)	C(28)-C(29)	1.381(5)
P(3)-C(52)	1.840(3)	C(28)-H(28)	0.9300
P(3)-C(46)	1.843(3)	C(29)-C(30)	1.380(5)
B-C(1)	1.629(5)	C(29)-H(29)	0.9300
B-C(7)	1.645(5)	C(30)-C(31)	1.380(5)
B-C(13)	1.662(5)	C(30)-H(30)	0.9300
B-C(14)	1.672(5)	C(31)-C(32)	1.380(5)
C(1)-C(2)	1.391(5)	C(31)-H(31)	0.9300
C(1)-C(6)	1.399(5)	C(32)-H(32)	0.9300
C(2)-C(3)	1.402(5)	C(33)-C(38)	1.397(5)
C(2)-H(2)	0.9300	C(33)-C(34)	1.400(5)
C(3)-C(4)	1.372(5)	C(34)-C(35)	1.383(5)
C(3)-H(3)	0.9300	C(34)-H(34)	0.9300
C(4)-C(5)	1.383(5)	C(35)-C(36)	1.387(5)
C(4)-H(4)	0.9300	C(35)-H(35)	0.9300
C(5)-C(6)	1.386(5)	C(36)-C(37)	1.377(5)
C(5)-H(5)	0.9300	C(36)-H(36)	0.9300
C(6)-H(6)	0.9300	C(37)-C(38)	1.396(5)
C(7)-C(8)	1.395(5)	C(37)-H(37)	0.9300
C(7)-C(12)	1.400(5)	C(38)-H(38)	0.9300
C(8)-C(9)	1.386(5)	C(39)-H(39A)	0.9600
C(8)-H(8)	0.9300	C(39)-H(39B)	0.9600
C(9)-C(10)	1.379(6)	C(39)-H(39C)	0.9600
C(9)-H(9)	0.9300	C(40)-C(45)	1.382(5)
C(10)-C(11)	1.369(6)	C(40)-C(41)	1.396(4)
C(10)-H(10)	0.9300	C(41)-F(41)	1.346(4)
C(11)-C(12)	1.392(5)	C(41)-C(42)	1.369(5)
C(11)-H(11)	0.9300	C(42)-F(42)	1.334(4)
C(12)-H(12)	0.9300	C(42)-C(43)	1.375(5)
C(13)-H(13A)	0.9700	C(43)-F(43)	1.330(4)
C(13)-H(13B)	0.9700	C(43)-C(44)	1.374(5)
C(14)-H(14A)	0.9700	C(44)-F(44)	1.334(4)
C(14)-H(14B)	0.9700	C(44)-C(45)	1.376(5)
C(15)-C(16)	1.385(5)	C(45)-F(45)	1.339(4)
C(15)-C(20)	1.393(5)	C(46)-C(47)	1.389(5)
C(16)-C(17)	1.369(5)	C(46)-C(51)	1.390(5)
C(16)-H(16)	0.9300	C(47)-F(47)	1.337(4)
C(17)-C(18)	1.397(5)	C(47)-C(48)	1.383(5)
C(17)-H(17)	0.9300	C(48)-F(48)	1.335(4)
C(18)-C(19)	1.370(5)	C(48)-C(49)	1.369(5)
C(18)-H(18)	0.9300	C(49)-F(49)	1.332(4)
C(19)-C(20)	1.380(5)	C(49)-C(50)	1.373(5)
C(19)-H(19)	0.9300	C(50)-F(50)	1.345(4)
C(20)-H(20)	0.9300	C(50)-C(51)	1.374(5)
C(21)-C(26)	1.383(5)	C(51)-F(51)	1.350(4)
C(21)-C(22)	1.399(5)	C(52)-C(57)	1.375(5)

C(52)-C(53)	1.395(5)
C(53)-F(53)	1.344(4)
C(53)-C(54)	1.374(5)
C(54)-F(54)	1.345(4)
C(54)-C(55)	1.370(5)
C(55)-F(55)	1.332(4)
C(55)-C(56)	1.370(5)
C(56)-F(56)	1.335(4)
C(56)-C(57)	1.384(5)
C(57)-F(57)	1.337(4)
C(58)-C(63)	1.364(6)
C(58)-C(59)	1.394(6)
C(58)-H(58)	0.9300
C(59)-C(60)	1.372(6)
C(59)-H(59)	0.9300
C(60)-C(61)	1.360(6)
C(60)-H(60)	0.9300
C(61)-C(62)	1.367(6)
C(61)-H(61)	0.9300
C(62)-C(63)	1.356(6)
C(62)-H(62)	0.9300
C(63)-H(63)	0.9300
C(39)-Pt-P(3)	81.40(9)
C(39)-Pt-P(2)	170.66(9)
P(3)-Pt-P(2)	104.89(4)
C(39)-Pt-P(1)	87.94(9)
P(3)-Pt-P(1)	168.96(3)
P(2)-Pt-P(1)	86.04(4)
C(39)-Pt-B	118.71(11)
P(3)-Pt-B	137.20(6)
P(2)-Pt-B	52.03(6)
P(1)-Pt-B	51.53(6)
C(13)-P(1)-C(21)	106.71(15)
C(13)-P(1)-C(15)	106.65(15)
C(21)-P(1)-C(15)	102.78(15)
C(13)-P(1)-Pt	116.89(11)
C(21)-P(1)-Pt	107.79(11)
C(15)-P(1)-Pt	114.83(11)
C(14)-P(2)-C(27)	108.00(16)
C(14)-P(2)-C(33)	101.88(15)
C(27)-P(2)-C(33)	100.48(15)
C(14)-P(2)-Pt	108.94(12)
C(27)-P(2)-Pt	112.42(11)
C(33)-P(2)-Pt	123.81(11)
C(40)-P(3)-C(52)	106.77(15)
C(40)-P(3)-C(46)	103.54(15)
C(52)-P(3)-C(46)	95.61(15)
C(40)-P(3)-Pt	108.21(11)
C(52)-P(3)-Pt	116.58(11)
C(46)-P(3)-Pt	124.26(11)
C(1)-B-C(7)	109.7(3)
C(1)-B-C(13)	109.4(3)
C(7)-B-C(13)	108.7(3)
C(1)-B-C(14)	112.2(3)
C(7)-B-C(14)	105.3(3)
C(13)-B-C(14)	111.5(3)
C(1)-B-Pt	89.81(18)
C(7)-B-Pt	160.0(2)
C(13)-B-Pt	67.02(16)
C(14)-B-Pt	61.44(16)
C(2)-C(1)-C(6)	115.1(3)
C(2)-C(1)-B	124.6(3)
C(6)-C(1)-B	120.1(3)
C(1)-C(2)-C(3)	122.7(3)
C(1)-C(2)-H(2)	118.6
C(3)-C(2)-H(2)	118.6
C(4)-C(3)-C(2)	119.9(3)
C(4)-C(3)-H(3)	120.0
C(2)-C(3)-H(3)	120.0
C(3)-C(4)-C(5)	119.3(3)
C(3)-C(4)-H(4)	120.4
C(5)-C(4)-H(4)	120.4
C(4)-C(5)-C(6)	119.9(3)
C(4)-C(5)-H(5)	120.1
C(6)-C(5)-H(5)	120.1
C(5)-C(6)-C(1)	123.1(3)
C(5)-C(6)-H(6)	118.5
C(1)-C(6)-H(6)	118.5
C(8)-C(7)-C(12)	114.8(3)
C(8)-C(7)-B	120.0(3)
C(12)-C(7)-B	125.0(3)
C(9)-C(8)-C(7)	123.2(4)
C(9)-C(8)-H(8)	118.4
C(7)-C(8)-H(8)	118.4
C(10)-C(9)-C(8)	119.8(4)
C(10)-C(9)-H(9)	120.1
C(8)-C(9)-H(9)	120.1
C(11)-C(10)-C(9)	119.5(4)
C(11)-C(10)-H(10)	120.3
C(9)-C(10)-H(10)	120.3
C(10)-C(11)-C(12)	120.0(4)
C(10)-C(11)-H(11)	120.0
C(12)-C(11)-H(11)	120.0
C(11)-C(12)-C(7)	122.8(4)
C(11)-C(12)-H(12)	118.6
C(7)-C(12)-H(12)	118.6
B-C(13)-P(1)	120.5(2)
B-C(13)-H(13A)	107.2
P(1)-C(13)-H(13A)	107.2
B-C(13)-H(13B)	107.2
P(1)-C(13)-H(13B)	107.2
H(13A)-C(13)-H(13B)	106.8
B-C(14)-P(2)	121.5(2)
B-C(14)-H(14A)	106.9
P(2)-C(14)-H(14A)	106.9
B-C(14)-H(14B)	106.9
P(2)-C(14)-H(14B)	106.9
H(14A)-C(14)-H(14B)	106.7
C(16)-C(15)-C(20)	118.7(3)
C(16)-C(15)-P(1)	120.0(3)
C(20)-C(15)-P(1)	121.3(3)
C(17)-C(16)-C(15)	120.6(3)
C(17)-C(16)-H(16)	119.7
C(15)-C(16)-H(16)	119.7
C(16)-C(17)-C(18)	120.8(4)
C(16)-C(17)-H(17)	119.6
C(18)-C(17)-H(17)	119.6

C(19)-C(18)-C(17)	118.6(3)	C(38)-C(37)-H(37)	119.7
C(19)-C(18)-H(18)	120.7	C(37)-C(38)-C(33)	120.6(3)
C(17)-C(18)-H(18)	120.7	C(37)-C(38)-H(38)	119.7
C(18)-C(19)-C(20)	121.1(4)	C(33)-C(38)-H(38)	119.7
C(18)-C(19)-H(19)	119.5	Pt-C(39)-H(39A)	109.5
C(20)-C(19)-H(19)	119.5	Pt-C(39)-H(39B)	109.5
C(19)-C(20)-C(15)	120.3(4)	H(39A)-C(39)-H(39B)	109.5
C(19)-C(20)-H(20)	119.9	Pt-C(39)-H(39C)	109.5
C(15)-C(20)-H(20)	119.9	H(39A)-C(39)-H(39C)	109.5
C(26)-C(21)-C(22)	118.5(3)	H(39B)-C(39)-H(39C)	109.5
C(26)-C(21)-P(1)	122.7(3)	C(45)-C(40)-C(41)	115.4(3)
C(22)-C(21)-P(1)	118.8(3)	C(45)-C(40)-P(3)	128.9(3)
C(23)-C(22)-C(21)	119.9(3)	C(41)-C(40)-P(3)	115.7(2)
C(23)-C(22)-H(22)	120.0	F(41)-C(41)-C(42)	117.7(3)
C(21)-C(22)-H(22)	120.0	F(41)-C(41)-C(40)	118.6(3)
C(24)-C(23)-C(22)	121.0(4)	C(42)-C(41)-C(40)	123.6(3)
C(24)-C(23)-H(23)	119.5	F(42)-C(42)-C(41)	120.5(3)
C(22)-C(23)-H(23)	119.5	F(42)-C(42)-C(43)	120.6(3)
C(23)-C(24)-C(25)	119.6(4)	C(41)-C(42)-C(43)	118.9(3)
C(23)-C(24)-H(24)	120.2	F(43)-C(43)-C(44)	120.1(3)
C(25)-C(24)-H(24)	120.2	F(43)-C(43)-C(42)	120.4(3)
C(24)-C(25)-C(26)	120.0(3)	C(44)-C(43)-C(42)	119.5(3)
C(24)-C(25)-H(25)	120.0	F(44)-C(44)-C(43)	119.8(3)
C(26)-C(25)-H(25)	120.0	F(44)-C(44)-C(45)	119.8(3)
C(21)-C(26)-C(25)	120.9(3)	C(43)-C(44)-C(45)	120.4(3)
C(21)-C(26)-H(26)	119.6	F(45)-C(45)-C(44)	116.7(3)
C(25)-C(26)-H(26)	119.6	F(45)-C(45)-C(40)	121.3(3)
C(32)-C(27)-C(28)	118.6(3)	C(44)-C(45)-C(40)	122.0(3)
C(32)-C(27)-P(2)	122.0(3)	C(47)-C(46)-C(51)	115.5(3)
C(28)-C(27)-P(2)	119.3(3)	C(47)-C(46)-P(3)	129.3(3)
C(29)-C(28)-C(27)	120.8(3)	C(51)-C(46)-P(3)	115.2(2)
C(29)-C(28)-H(28)	119.6	F(47)-C(47)-C(48)	116.0(3)
C(27)-C(28)-H(28)	119.6	F(47)-C(47)-C(46)	121.7(3)
C(30)-C(29)-C(28)	119.9(3)	C(48)-C(47)-C(46)	122.3(3)
C(30)-C(29)-H(29)	120.1	F(48)-C(48)-C(49)	120.0(3)
C(28)-C(29)-H(29)	120.1	F(48)-C(48)-C(47)	120.0(3)
C(29)-C(30)-C(31)	119.9(3)	C(49)-C(48)-C(47)	119.9(3)
C(29)-C(30)-H(30)	120.1	F(49)-C(49)-C(48)	121.0(3)
C(31)-C(30)-H(30)	120.0	F(49)-C(49)-C(50)	119.4(3)
C(32)-C(31)-C(30)	120.4(3)	C(48)-C(49)-C(50)	119.7(3)
C(32)-C(31)-H(31)	119.8	F(50)-C(50)-C(49)	120.4(3)
C(30)-C(31)-H(31)	119.8	F(50)-C(50)-C(51)	120.2(3)
C(31)-C(32)-C(27)	120.3(3)	C(49)-C(50)-C(51)	119.4(3)
C(31)-C(32)-H(32)	119.8	F(51)-C(51)-C(50)	117.9(3)
C(27)-C(32)-H(32)	119.8	F(51)-C(51)-C(46)	119.0(3)
C(38)-C(33)-C(34)	117.8(3)	C(50)-C(51)-C(46)	123.1(3)
C(38)-C(33)-P(2)	122.5(3)	C(57)-C(52)-C(53)	115.7(3)
C(34)-C(33)-P(2)	119.4(3)	C(57)-C(52)-P(3)	122.8(3)
C(35)-C(34)-C(33)	121.3(3)	C(53)-C(52)-P(3)	121.3(2)
C(35)-C(34)-H(34)	119.3	F(53)-C(53)-C(54)	117.8(3)
C(33)-C(34)-H(34)	119.3	F(53)-C(53)-C(52)	120.1(3)
C(34)-C(35)-C(36)	120.1(3)	C(54)-C(53)-C(52)	122.0(3)
C(34)-C(35)-H(35)	119.9	F(54)-C(54)-C(55)	119.1(3)
C(36)-C(35)-H(35)	119.9	F(54)-C(54)-C(53)	120.4(3)
C(37)-C(36)-C(35)	119.5(3)	C(55)-C(54)-C(53)	120.5(3)
C(37)-C(36)-H(36)	120.2	F(55)-C(55)-C(54)	120.5(3)
C(35)-C(36)-H(36)	120.2	F(55)-C(55)-C(56)	120.4(3)
C(36)-C(37)-C(38)	120.6(4)	C(54)-C(55)-C(56)	119.1(3)
C(36)-C(37)-H(37)	119.7	F(56)-C(56)-C(55)	120.6(3)

F(56)-C(56)-C(57)	119.8(3)	C(61)-C(60)-H(60)	119.6
C(55)-C(56)-C(57)	119.6(3)	C(59)-C(60)-H(60)	119.6
F(57)-C(57)-C(52)	121.9(3)	C(60)-C(61)-C(62)	119.7(4)
F(57)-C(57)-C(56)	115.2(3)	C(60)-C(61)-H(61)	120.2
C(52)-C(57)-C(56)	122.9(3)	C(62)-C(61)-H(61)	120.2
C(63)-C(58)-C(59)	119.2(4)	C(63)-C(62)-C(61)	120.4(4)
C(63)-C(58)-H(58)	120.4	C(63)-C(62)-H(62)	119.8
C(59)-C(58)-H(58)	120.4	C(61)-C(62)-H(62)	119.8
C(60)-C(59)-C(58)	119.1(4)	C(62)-C(63)-C(58)	120.8(4)
C(60)-C(59)-H(59)	120.4	C(62)-C(63)-H(63)	119.6
C(58)-C(59)-H(59)	120.4	C(58)-C(63)-H(63)	119.6
C(61)-C(60)-C(59)	120.8(4)		